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INDEX

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[For Index of Register of Patents, Correspondence, and Parliamentary and Legal Intelligence, see pp. vii. and viii.

A. C. W. on Holidays, 190
Aberdeen Gas Undertaking—
  Price of Gas, 527
  Workers' Strike, 526
Aberystwyth Gas Company's Coal Difficulties, 334, 366
Accidents, 388
Accounts of Metropolitan and Suburban Gas Companies, 318, 319
Accrington Gas Undertaking Losses, 209, 291
Addison, Dr., on Munitions Organization, 12, 71
Air Raids—
  Gas Main Damaged by, 345
  Public Lights for Signalling, 188
Airdrie Gas Undertaking—
  Annual Report, 291
  Staff Changes, 59, 101, 210, 267, 268
Aldershot Gas, Water, &c., Company—
  Accounts, 167
  Edwards, Mr. R. W., Appointed Managing Director, 268
  Meeting of Shareholders, 289
Alexander's Incandescent Gas Burner, 325
Alkali Works, Annual Report of the Chief Inspector on, 265, 268, 281, 288, 315, 322, 372
Alliance and Dublin Consumers' Gas Company—
  Compensation for Damage Caused by Sinn Fein Disturbance, 578
  District Lighting, 479
  Dividend, 474
  Domestic Water Heater Demonstration, 107
  New Compressor House, 482
  Report and Accounts, 521, 578
Alloa Gas Department, 164
Allotment Gardening in Gas Works, 206
Alting, Heer, on the Carbonization of Dust and Soot, 197
Ambler, Mr. F. G., on Intermittent Retorts for Medium Sized and Small Gas Works, 276, 331
America—
  Beehive Coke Production in, 154
  Briquette Output in, 326
  Coal Tar Products and Dye Stuffs in, 296, 321
  Conventions in War Time in, 228
  Dye Combination in, 241
  Food Economy in, 483
  Gas Companies and the Liberty Loan, 457
  Gas Engine (Large) Installations in, 274
  Gas Meters in, 377
  Gas Works and Allotment Gardening in, 206
  Official Bulletins and Reports, 152, 154 (2), 197, 229, 284, 326 (2), 409, 563
  One National Gas Association for, 270
  Postponement of Technical Meetings in, 20
  Research in, 19
  Sulphate of Ammonia Statistics, 240
  Synthetic Gasolene Manufacture in, 68
  Toluol Requirements in, 268
American Chemical Society—Dr. W. Rittman on Synthetic Gasolene, 68
American Gas Institute—
  Gartley, Mr. W. H., on the Demand for Toluol, 268
  Leslie, Mr. E. H., on Thermal Decomposition of Hydrocarbons, 420
  National Gas Association Question, 270
  Postponement of Meeting, 20
  Sperr and Kohr, Messrs., on Analysis of Small Quantities of Light Oil, 409
  Transactions for 1916, 19
American Society of Testing Material, 515
Ammonia Recovery from Gas Liquor, 471
Amsterdam Gas Works—
  Carbonization of Dust and Soot at, 197
  Coal Prices and Cost of Gas, 241
Analysis, Gas, Progress of, 23
Angers Gas Works, 234
Annfield Plain Gas Company, 411, 552
Appledore Gas Works Sold, 168
Arbitrations, Gas Workers' Wages—
  Brighouse, 392
  Bury, 164
  Dundee, 168
  Edinburgh, 205
  Leeds, 243
  Manchester, 392
  Stockport, 290
  Todmorden, 209
  Warrington, 159
Arbroath Gas Workers' Wages, 346
Armadale Gas Works, 552
Ashes and Dust, Coal Concreted from, 242
Ashton Chemical Works Explosion, Damage to Gas Works by, 16, 74, 112, 164, 201, 335
Association of British Chemical Manufacturers, 231
Association of Municipal Corporations, 143
Atalanta (Ga.), Gas Distribution at, 516
Australia—
  Benzene and Toluene Manufacture in, 17
  Gas Workers' Dispute in, 387
Australian Gas Light Company, 387, 390
Austria-Hungary, Gas Works in, 275
Baltimore, New Purifier House at, 283
Bangor (co. Down) Gas Uudertaking, 332, 391
Barnes and the Calorific Power Question, 117
Barnet District Gas and Water Company, 427, 556
Barnsley Gas Company, 434
Barr, Mr. W. H., on the Melting Points of Refractory Materials, 236
Barrett Company's (New York) Sulphate of Ammonia Statistics for 1915-16, 240
Barrow Gas Undertaking—
  Coal Question, 483
  Workers and the Tribunal, 388
Bates, Mr. John S., on Wood Distillation, 291
Batley Gas Undertaking, 236, 527
Battersea Polytechnic Classes in Gas Engineering and Manufacture, 206
Beckenham Electricity Undertaking, 320, 365
Belfast Gas Undertaking—
  Annual Report, 28
  Death of the Manager of the Stove Department, 552
  Visit of the Irish Association of Gas Managers to the Works, 331
  Wages Question, 294
Bell and Nesbit, Messrs., on Working Qualities of Silica Bricks, 515
Benn, Mr. E. J. P., on the Trade of To-Morrow, 195
Bennik's Boiling Ring and Automatic Gas Tap, 21
Bentham Gas Company, 578
Benzol and Toluol—
  After the War, 118, 577
  American Demand for, 268
  Automatic Temperature Control in Debenzolizing Oil, 21
  Competition with Petrol, 99
  Estimation of Toluene and Benzene in Coal Tar Oils, 22
  Keighley Plant, 33
  Ministry of Munitions Order Respecting Crude Benzol, Crude Naphtha, and Light Oils, 412
  Observations on Crude Coke Oven Benzol, 69
  Some Sources of Benzene and Toluene for High Explosives, 148
  Toluene from Water Gas, 23
Benzol Producers' Committee, 550
Berlin—
  Gas Panic in, 389, 457
  Public Lighting, 35
Bermondsey Electricity Charges, 79
Berwick Gas Company, 161
Bexhill Water and Gas Company—
  Calorific Power Order, 280
  Report and Accounts, 527
Biddison, Mr. P. M'Donald, on Automatic Control in Debenzolizing Oil, 21
Biddulph Gas Undertaking, 38
Bills (*see* Parliamentary Intelligence)
Bingley Calorific Power Order, 333
Birkenhead Gas Works—
  Accounts, 78, 163
  Meter Rents Question, 209
  Strike, 389
Birmingham Gas Undertaking—
  Calorific Power Order, 141
  Gas Fitters' Wages, 389
Bishop's Stortford, &c., Gas and Electricity Company, 433
Bispham Electricity Deficit, 38
Blackburn Gas Works—
  Chairmanship, 367
  Engineership, 59, 78
  Report, 30
Blackpool Gas Undertaking—
  Calorific Power Order, 333
  Engineer's and Assistant Manager's Salaries, 289
Blairgowrie Gas Engineership, 101, 267
Blandford, A Concrete Tar and Liquor Tank at, 279
Board of Trade—
  Calorific Power Orders (*see* Calorific Standard)
  Coal Prices Order, 475
  Commercial Intelligence Branch, 456
  Electrical Power Supply Committee, 18, 61, 104, 142, 230, 270, 320, 368, 412
  Fuel Exports, 14, 186, 367, 552
  Fuel Research Board, 138, 141, 225, 417
  Quality and Pressure of Gas Supply, 141, 210
  Women in Gas Works, 508, 518
Boilers—
  Bye Products Steam, 369
  Coke for, 100
  Domestic—
    Dublin Demonstration, 107
    Newton, Mr. Thos., on, 106
  Gas Fired—
    For the Repair of Automobile Tyres, 333
    Morgan, Mr. A. W., on, 523
Boiling Ring with Automatic Gas Tap, 21
Bo'ness Gas Company, 243
Books Received—
  Industrial Research in America (Fleming), 19
  Principles of Industrial Administration (Toogood), 187
  Registration of Directors' Names (Jordan), 411
Books Received (*continued*)—
  Scientific Treatise on Smoke Abatement (Hamilton), 229
  Trade of To-Morrow (Benn), 195
  Transactions—
    American Gas Institute, 19
    Société Technique du Gaz, 70
Borris-in-Ossory Public Lighting, 573
Boston Gas Company and the Sliding Scale, 97, 102
Bournemouth Gas and Water Company—
  Gas Driven Motors, 327, 459
  Meeting of Shareholders, 384
  Report and Accounts, 344
Bradfield's, Mr. F. J., Comparative Working Results of Metropolitan and Suburban Gas Companies, 318, 319
Bradford Gas Undertaking—
  Chemical Works Staff, 101
  Commission for a Stoker, 243
  Supplying Gas for Motors, 478
Braziers' and Sheet Metal Workers' Union, 237
Brecon Gas Company's Calorific Power Order, 280
Brentford Gas Company—
  Complaints of Pressure, 520
  Quality of the Gas, 163
Bridport Gas Company, 388
Brighouse Gas Undertaking—
  Staff Change, 552
  Workers' Wages, 167, 392, 575
Brighton and Hove Gas Company—
  Accounts, 433
  Increase in Price, 119
  Meeting of Shareholders, 475
Briquette Output in America, 326
British Association Meeting Cancelled, 105
British Commercial Gas Association—
  Coal Gas as a Motor Fuel, 233
  Literature, 58, 187, 411
British Gas Light Company—
  Calorific Power Order (Hull), 280
  Dividend, 436
  Entertaining Wounded Soldiers at Hull, 228
  Presentation to an Old Employee, 411
British Industries Federation (*see* Federation), 186
British Manufacturers' Association (*see* Incorporated National Union of Manufacturers)
British Thermal Unit Symbol, 100, 106, 152
British Westinghouse Company's War Relief Fund, 436
Briton Ferry Gas Works, 560
Brook's, Mr. A. S., Presidential Address to the Irish Association, 271
Burner, Alexander's, 325
Burnley Gas Works—
  Accounts, 344
  Supply of Gas Oil, 244
  Wages Question, 576
Burnley Public Lghting, 242
Burton-upon-Trent Gas Undertaking—
  National Baby Week Efforts, 79
  Rate Relief, 293
  Staff and the War, 267
  Wages Question, 209, 389
Bury Gas Undertaking—
  Holidays and Pay for Plumbers, 208
  Wages Question, 164
Buxton Gas Accounts, 201
Bye Products Recovery, Fuel Board and, 225

Calcutta Public Lighting Contract, 33
Calorific Power—
  Hunt, Mr. Charles on, 265
  Indiana Gas Association and, 143
  Inert Gases and, 57
  New Jersey and, 242
  Of Industrial Gaseous Fuels, 148
Calorific Standard Act—
  Applications for Orders under the, 23, 37, 63, 187, 280, 556
  Orders Granted under the, 23, 77, 63, 141, 187, 280, 333, 411, 556
Calorimeter Tables, 229
Cambourne Gas Company, 429
Cambridge Gas Company, 289
Campbell Gas Engine Company, 575
Canada, Wood Distillation in, 291
Canadian Gas Association, 377
Canadian Society of Civil Engineers, 291
Canteens, Gas for Industrial, 152
Captive Fire, Mr. A. C. Ionides on the, 563
Carbide Companies Amalgamation, 321
Carbonization (*see also* Retorts)—
  Ideal, 421
  Low Temperature—
    Electricians and, 230
    Maclaurin, Mr. Robert, on, 68
    Marshall, Mr. F. D., on, 517
    Tar Production and, 313, 363, 379, 409, 421, 473
    United States Bureau of Mines and, 284
    Winmill, Mr. T. F., on, 461

JC
v.139

Carbonization (*continued*)—
Nine Thousand Feet per Ton of Coal, 459
Of Dust and Soot, 197
Open Construction of Plant at Macon (U.S.A.), 370
Volatile Products of Coal, 326
Carlisle Gas Accounts, 119
Carnarvon Gas Undertaking, 486
Caro, Mr. N., on Rational Utilization of Fuels, 144
Carpenter, Mr. Charles—
Co-Partnership in War Time, 73
Presidential Address to the Society of Chemical Industry, 145
Catrine Gas Company, 120
Cattell, Mr. W. H., on Promoting Sales, 550, 560
Cavan, Increase in the Price of Gas at, 244
Cement, Specification for Portland, 154
Ceylon, Monazite Sand in, 368
Chance and Hunt, Ltd., 35
Charpy and Godchot, MM., on Coke Production, 152
Chelmsford Gas Works Transfer Costs, 203
Cheltenham Electricity Undertaking, 510
Chemical Discoveries and Processes in Germany, 511
Chemical Engineering and Wilton's Patent Furnace Co., Ltd., 343, 485
Chemical Engineering Corporation, Ltd., 343
Chemical Manufacturers' Association (*see* Association)
Chemical Society and the Progress of Chemistry and Gas Analysis, 23
Chemistry and Gas Analysis, Progress of, 23
Chester United Gas Company, 432
Chicago Gas Controversy, 429
Chichester Gas Company, 484
City and Guilds of London Examinations—
Gas Engineering, 15, 59, 101, 141
Gas Fitting, 101
Gas Supply, 15, 101, 141
Programme for 1917-18, 274
Clay Ring Company, 210
Cleckheaton Gas Worker's Leaving Certificate, 574
Clerks in Electric Light and Gas Offices, 237
Clevedon Calorific Power Order, 187
Clones (co. Monaghan) Gas Managership, 509
Coal—
Adulterated, 366, 375
Brown, Utilization of, 234
Chemistry of, 415, 416
Complete Gasification of, 57, 67
Concreted, from Dust and Ashes, 242
Contracts and the Redistribution Scheme, 55
Controller (*see* Coal Mines Controller)
Determining the Gas Production of, 237, 285
Economy (*see* Fuel)
Exports, 14, 186, 367, 552
France and English Supplies, 111
German Gas Works Supplies of, 554
Household Distribution Order, 345
Nine Thousand Cubic Feet per Ton of, 459
Oil and Oil Products from, 511
Price Limitation, 57, 456, 475, 519
Prices in Amsterdam, 241
Profiteering in, 321, 507, 517
Rations, 342
State Control of, 111, 186, 285
Statistics for 1916, 554
Supplies by Public Authorities, 35, 118, 436
Coal Carbonizing Parent Syndicate, 483
Coal Miners' Wages, 392, 409
Coal Mines, Breathing Apparatus Used in, 243
Coal Mines Controller—
Appeal for Coal Gas Manufacture, 141, 183
Coal Adulteration, 366
Coal and Coke Rations, 342
Coal Economy, 75
Communications to the, 22
Directions as to the Sale of Coal, 29, 32
Editorial Comments, 12, 55, 366, 454, 507 (2)
Electricity and Coal Economy, 189
Gas Works Requirements, 77, 334, 366
House Coal Prices, 520
Isle of Wight Prices, 118
Pit Prices for Coal, 519
Prices of Coal, 456, 475, 507, 519, 520, 551
Scottish Gas Works and the Regulations, 103, 390
Transport and Distribution Scheme, 55, 63, 103, 165, 167, 208, 366, 454
Coalite—
Correspondence, 110
Editorial Comments, 140
Shares, 118, 159
Coatbridge Gas Company—
Engineer's Salary, 74
Meeting of Shareholders, 244
Quality of the Gas, 294
Treasury and Capital Requirements, 345
Coblenz, Mr. W., on Electricity and Eyesight, 321
Coke—
American Production of Beehive, 154
Boiler Firing by (*see* Boilers)
Exports, 14, 186, 367, 552
Production, Effect of the Temperature of Carbonization on Physical Properties in, 152
Question in Parliament as to Selling by Weight, 285
Rations, 342
Zimmer's, Mr. G. F., Data Concerning, 321
Coke Oven Gas, Sheffield Gas Company and, 164
Coke Oven Managers' Association—
Editorial Comments, 226
Scott, Mr. E. Kilburn, on the Manufacture of Nitrate of Ammonia by Electric Power at Coke Oven Plants, 226, 235
Coke Ovens—
Koppers Patent Litigation, 26, 200
Manufacture of Nitrate of Ammonia by Electric Power at, 226, 235
Colchester Gas Company, 414, 484
Colour Temperature of Gas Flames, 70
Combustion Products Radiator, Kemp's, 515
Commercial Gas Company—
Meeting of Shareholders, 338
Report and Accounts. 229
Working Results, 318, 319
Companies—
New Joint Stock—
Chemical Engineering and Wilton's Patent Furnace Co., Ltd., 343, 485
Chemical Engineering Corporation, Ltd., 343
Clay Ring Company, 210
Coal Carbonizing Parent Syndicate, 483
Complete Gas Combustion, Ltd., 293
Incorporated National Union of Manufacturers, 141, 186
Otto Coke Oven Company Successors, 80
Particulars as to Directors Act, 267, 411
Compensation, Workmen's—
Increased Payments Question, 111, 344
Insurance Premiums Raised, 344
War Addition Act, 387
Complete Gas Combustion, Ltd., 293
Concrete Tar and Liquor Tank at Blandford, 279
Connecticut, Gas Progress in, 167
Consolidated Gas Company (New York) and Food Economy, 483
Consumers, Prices to Different Classes of, 317
Conventions in War Time, 228
Cooking by—
Electricity (*see also* Stoves)—
Marylebone Electricity Committee and, 369, 510
v. Gas, 189, 510
Gas—
Economy and Health through, 56
Electrical Press and, 458, 510
Cootehill Public Lighting, 117
Co-Partnership—
Gloucester Gas Company and, 527
In War Time, 73, 364
Copper, Fine for Illegal Use of, 382
Cork Gas Consumers' Company, 485
Coventry Gas Works—
Report, 31
Staff Appointment, 552
Cowdenbeath Gas Company, 321
Creosote Restrictions, 117, 285
Crieff Gas Undertaking, 367
Croydon Gas Company—
Meeting of Shareholders, 383
Pension Fund, 169
Report and Accounts, 344
Staff and the War, 141

"Daily Telegraph" Engineering Observer on Gas Driven Motor Vehicles, 280
Dalbeattie Gas Managership, 485
Darwen Gas Undertaking—
Comparison with Electricity Undertaking, 208
Wages Question, 197
Davies, Mr. E., on the Hydraulic Regulator Controlling Steam Driven Exhauster Engines, 63
Daylight Saving (*see* Summer *and* Winter Time)
Deaths—
Brocklebank, Lieut. B. V., 268
Burr, Robert, 15
Corry, George, 552
Curphey, Captain W. G. S., 228
Gibb, Lieut. J. H., 228
Gillies, Alderman A., 509
Green, Benjamin, 59
Harrison, Thomas, 59
Hart, Alderman Lazarus, 457, 566
Hastings, Lieut. G. W., 268
Kendall, G. S., 101
Laver, Alderman Henry, 414
Layton, Eric William, 367
Miles, John, 101
Moss, Frank E., 368
Napier, Andrew, 367
Nuttall, Alderman Alfred, 367
Paiton, Maurice, 15
Pilbrow, Stanley Edward, 367, 509
Scott, Francis, 552
Warren, Lieut. Alan John, 101
Wood, Sir Edward, 552
Debentures, The Question of the Re-issue of, 334, 381
Dellwik-Fleischer Water Gas Process, 57, 67
Dempster-Toogood Verticals at Longwood, 192
Derby Gas Company—
Calorific Standard Application, 187
Presentation to an Old Employee, 457
Detroit Gas Company, 484
Deville Process for the Abrupt Condensation of Naphthalene, 22
Dewsbury, Price of Gas at, 72
Diesel Engine Users' Association, 205
Directors Act 267, 411
Distribution, Mr. C. J. Winmeister on, 516
Doncaster Gas Company—
A Correction, 24, 72
Staff Changes, 367, 457
Strike of Workers, 526, 570
Water Gas Plant, 245
Dorchester Gas Company, 293
Dover Electricity Undertaking, 553
Dover Gas Company, 391, 528
Dublin Public Lighting, 479
Dudley Gas Company, 526
Dukinfield Gasholders Wrecked by Chemical Works Explosion, 16, 164, 201
Dundee Gas Undertaking—
Accounts, 78
Assistant Managership, 141, 267, 321
Progress, 163
Wages Question, 37, 168
Dunfermline Gas Works, 32, 114
Dunglinson, Mr. B., on Ammonia from Gas Liquor, 471
Dunn, Mr. G. F., on a Reinforced Concrete Tar and Liquor Tank, 279
Dust and Ashes, Coal Concreted from, 242
Dust and Soot, Carbonization of, 197
Dutch Association of Gas Managers, 275
Dye Industry—
American Combination, 241
Enemy Patents, 111, 239
Export of Dyestuffs, 295
German Combination, 471

Eastbourne Gas Company, 295, 433
Eastbourne to London Gas Motor Bus, 375
Edinburgh and Leith Gas Commissioners—
Annual Accounts, 200
Automatic Lighting, 576
Employee's Clearing Certificate, 342
Engineer's Report on Retort House Work, 204
War Bonus and Wages Question, 28, 110, 204, 205
Egypt, Lighting Reduction in, 296
Electricity—
Cables, Overheating of, 19
Centralized Generating Stations, 18, 230
Charges, Basis of, 18, 142
Coal Economy and, 189
Consumers and Gas Stoves, 413, 553
Economical Production of, 230, 553
Eyesight and, 321
Fire Risks and Dangers of, 434, 478
Government Departments' Preference for, 285
Interlinking Schemes, 368, 509
Non-Essential Consumers of, 510
Overhead Transmission Question, 104
Power Supply Committee, 18, 61, 104, 142, 230, 270, 320, 368, 412
Preferential Charges for, at Hackney (*see* Hackney)
Rate Aided Competition of, 320, 365
Undertakings and Rate Aid, 335
Wiring by Local Authorities in America, 270
Electrolysis of Gas Pipes, 563
Employers and Employed, Relations between, 58
Enemy Patents—
Coal Tar—
Dyes, 111, 239
Flavine, 111
Flexible Metallic Tubing, 35
Koppers Coke Oven, 26, 200
Engines—
Diesel, and Depreciation Allowance, 205
Gas (*see also* Turbines)—
Large, in America, 274
Tar Oil as Fuel for, 527
European Gas Company—
Directorate and Auditorship Changes, 101
Meeting of Shareholders, 160
Staff and the War, 187
Examinations—
City and Guilds Programme, 274
Gas Engineering, 15, 59, 101, 141
Gas Fitting, 101, 197
Gas Supply, 15, 101, 141, 556
Exeter, Calorific Power Testing Apparatus for, 293
Exhauster Engines, The Hydraulic Regulator Controlling Steam Driven, 63
Explosions—
Ashton Chemical Works (*see* Ashton)
Gas, 410, 431, 479
Exports—
Dyestuffs, 295
Fuel, 14, 186, 367, 552
Prohibitions, 345
Sulphate of Ammonia, 167
Eyesight, Electricity and, 321

F. W. G. on Coal Gas as a Motor Fuel, 233
Federation of British Industries, 186, 367
Federation of Gas Engineers, 551, 555
Fenby, Mr. A. V. C., on Apparatus for Reducing Volumes of Gases to Standard Temperature and Pressure, 153
Fire Clay (*see* Refractory)
Fires, Gas, Outlook for, 140
Fire Caused by Gas Stove, 436
Fisher-Fiddes Tar Fog Extractor, 13, 20, 70
Flames, Colour Temperature of Gas, 70
Flavine Patent Litigation, 111
Fleming, Mr. A. P. M., on Industrial Research in the United States, 19
Flexible Metallic Tubing Company, 35
Food Economy, Gas and, in America, 483
France—
Coal Supplies in, 111
Wounded British Gas Men in, 13, 15, 231
Fraserburgh Gas Undertaking, 119
Fruit and Vegetables, Gas for Preserving, 187

Fuel—
Calorific Value of Industrial Gaseous, 148
Industrial, from Gas Works, 146, 185, 195
Research at Leeds University, 141
Research Board (*see* Fuel Research Board)
Town's Gas as, 149
Utilization of Waste for, 242
Fuel Economy—
Caro, M., on, 144
Electricity Undertakings and, 105
Smith, Mr. E. W., on, 146, 185, 195
Fuel Research Board—
Bye Products Recovery, 225
Editorial Comments, 138, 185, 225, 316
Offices, 165
Quality and Pressure of Gas, 141, 316
Utilization of Irish Peat, 165
Work of the, 417
Furnaces (*see also* Industrial)—
Electric—
Hirshfeld, Mr. C. F., on, 105
Steel, 231
Gas—
Annealing, 68
Automatic Control of, 284
Soft Metal. 210
Taudevin, Mr. E. P., on, 197

Gainsborough Gas Workers' Wages, 526
Galashiels Gas Company, 552
Gartley, Mr. W. H., on Toluol in America, 268
Gas—
Adulteration of, 24, 57, 70, 75
And Business System, 566
Appeal for the Manufacture of Coal, 141
Appeal to Consumers, 244
As a Labour Saving Agent, 112, 152
Chart for Computing the Cost of, 144
Composition, Inquiry into, 316
Consumption for Various Purposes, 75
Controller Canard, 316, 369, 510
Electricity *v.*, 62
In the Home, 112
Industrial Application of (*see* Industrial)
Inert, 57
Prices, Lea Block Rate System, 317
Promoting Sales of, 550, 560
Quality and Pressure of, 141, 210, 571, 577
Standard Price Question (*see* Sliding Scale)
Gas Engineering—
Classes at the Battersea Polytechnic, 206
Examinations, 15, 59, 101, 141
Gas Engineers, Federation of, 551, 555
Gas Fitting Examinations, 101, 197
Gas Light and Coke Company—
Accident at the Beckton Works, 388
Directorate, 59, 267
Dividend, 141, 186
Hackney Preferential Electricity Charges, 62, 139, 157, 183, 198, 269
Islington Public Lighting Price, 72
Liability for Negligence of Workmen, 25
Loss of the s.s. "Flamma" and "Glow," 296, 485
Presentations to Mr. Henry Rayner, 58
Standard Price Alteration, 237
Gas Manufacture (*see* Manufacture)
Gas Supply Examinations, 15, 101, 141, 556
Gas Works—
Alleged Nuisance Caused by, 36, 208
Allotment Gardening in America, 206
Descriptions of Works—
Briton Ferry, 560
Longwood, 190, 192
Macon (U.S.A.), 370
Farm Labour and, 456
Industrial Fuel from, 146
Lights at, 239
Sale of the Appledore, 168
Stopping and Restarting, 234
War Time Experiences of, in Germany, 232, 272, 324, 548
Women in (*see* Women)
Gases—
Apparatus for Reducing Volumes of, to Standard Temperature and Pressure, 153
Inflammability Limits of Mixtures of, 563
Gasholder Tanks, Protecting, from Thin Ice, 17
Gasholders, Destruction of, through Chemical Works Explosion at Ashton (*see* Ashton)
Gasolene, Synthetic, in America, 68
German Association of Gas and Water Engineers—
Council Report, 377, 419
Editorial Comments, 548
Presidential Address of Herr Hase, 232, 272, 324, 548
Review of the Annual Meeting, 188, 231
Germany—
Chemical Discoveries and Processes in, 511
Coal Supply to Gas Works in, 554
Control of Mantles in, 326
Dyestuff Combination in, 471
Gas and Electricity Restrictions in, 98, 111, 269, 317, 376, 389, 412, 457, 548
Gas and Water Works, War Time Experience in, 232, 272, 324, 548
Gas Consumption Statistics, 38
Gas Tickets in, 206
Nitrogen Fixation in, 100
Refractory Products in, 563
State Control of Gas Works in, 376
Winter Daylight Saving in, 516
Gibley, Prof. F. H., on Welded *v.* Screwed Pipe Connections, 514
Gilbert, Mr. H. E., on Automatic Control of Furnaces, 284
Gillingham, Tar Oil for Engines at, 527
Gisborne Gas Company, 59
Glasgow Gas Lighting Centenary, 382
Glasgow Gas Undertaking—
Calorific Power Order, 77
Coal Contracts, 77
Gas for Motor Vehicle Experiments, 428
Increase in Price, 77, 347
Staff Change, 411
Women Workers' Wages, 485
"Glasgow Herald" on Benzol after the War, 577
Glass, Jena, 156
Gloucester Gas Company, 433, 527
Godchot and Charpy, MM., on Coke Production, 152
Goole Gas Department Losses, 526, 576
Gosport Calorific Standard Application, 556
Government Departments, Vagaries of, 285
Grain, Mr. G. D., on the Industrial Sales Department, 291
Grangemouth, Price of Gas at, 578
Grantham Gas Company, 286
Great Wigston Gas Company, 482
Greaves-Etchells Electric Steel Furnace, 231
Greenock Gas Undertaking—
Assistant Engineership, 411
Engineership, 141, 267
Presentation to Mr. James Macleod, 367
Surplus, 392
Guildford Calorific Standard Order, 63

Haber Process in Germany, 100
Hackney, Preferential Charges for Electricity at, 62, 139, 157, 183, 198, 269
Halifax Gas Undertaking—
Coke Prices, 243
Cyanide Plant, 35
Labourer's Leaving Certificate Refused, 210
Wages Question, 347
Women Lamplighters, 527
Hamilton, Mr. H., on Smoke Abatement, 229
Hammersmith Borough Council and Gas Pressure, 520
Hancock and King, Messrs., on Fire Clay, 146
Harker, Mr. G., on Estimation of Toluene and Benzene in Coal Tar Oils, 22
Harrogate Electricity Undertaking and a Bye Product Steam Boiler, 369
Harrow and Stanmore Gas Company, 389, 477
Hart's, The Late Alderman Lazarus, Gift to Ramsgate, 566
Hase, Herr M., on Gas and Water Works in War Time, 232, 272, 324, 548
Hastings and St. Leonards Gas Company—
Price of Gas, 346
Report and Accounts, 527
Worker's Certificate Withdrawn, 388
Hathersage Gas Company, 388
Häusser's, Prof., Process for the Manufacture of Nitric Acid from Coal Gas, 21
Haywards Heath Gas Company, Charges against an Ex-Secretary, 111
Heating Symbols Unification, 100, 106, 152
Hebden Bridge and Mytholmroyd Gas Board, 367
Heckmondwike—
Calorific Standard, 23, 79
Meter Charges at, 483
Henley-on-Thames Gas Company, 205
Heywood Gas Works Report, 30
High Wycombe Gas Company, 523
Hirshfeld, Mr. C. F., on the Electric Furnace, 105
Hirst, Mr. Hugo, on Economical Electricity Generation, 230
Hoffman, Mr. E. J., on Toluene from Water Gas, 23
Holidays, A. C. W. on, 190
Home, Gas and Labour Saving in the, 112
Home Office—
And Women in Gas Works, 508, 518
Mines and Quarries Report for 1916, 554
Horley Gas Company, 411, 569
Hornsey Gas Company, 426, 570
Huddersfield Technical College, Sir John Ramsden's Gift to, 22
Hull Corporation Gas Department, 292
Humphrys, Mr. Norton H., on—
Adulterated Coal, from a National Aspect, 375
Institution of Gas Engineers, 143
Nine Thousand Cubic Feet per Ton of Coal, 459
Hunt, Mr. Charles, on the Calorific Power Question, 265
Huntly Gas Company, 289
Hydrocarbons, Thermal Decomposition of, 420
Hythe Gas Works and Lights, 239

Ice, Protecting Gasholder Tanks from, 17
Ilford Gas Company—
Electricity Audit, 38
Meeting of Shareholders, 521
Ilkley, Strike of Gas Workers at, 37
Illuminating Engineering Society (American)—
Abandonment of Meetings, 101
Correspondence Convention, 195
Editorial Comments, 551
Myers, Mr. E. B., on Maintenance of Gas Lamps in Residences, 572
Papers, 333
Presidential Address of Mr. W. J. Serrill, 551, 567
Illuminating Engineering Society (German), 556
Imperial Continental Gas Association's Buda Pest Works, 15
Incandescent Mantles (*see* Mantles)
Income Tax Allowance on Diesel Engines, 205
Incorporated Municipal Electrical Association—
And the Electric Power Supply Committee, 320
Presidential Address of Mr. F. M. Long, 18
Incorporated National Union of Manufacturers, 141, 186
Increases in the Price of Gas—
Allocation of, 14
Gas Undertakings and, 30, 37, 72, 76, 77, 78, 79, 110, 119, 169, 244, 290, 292, 345, 346, 347, 428, 432, 479 (3), 482, 483, 484, 527, 575 (3), 576, 578 (2)
Indiana Gas Association and Calorific Standard, 143
Industrial Administration, Principles of, 187
Industrial Applications of Gas (*see also* Furnaces)—
Boiler Firing, 523
Canteens, 152
Heating Wheel Tyres, 284
Ionides, Mr. A. C., on, 563
Metal Melting, 210, 263
Pickering, Mr. W. J., on, 148
Pilnecek, Mr. E. A., on, 516
Rahn, Mr. Bruno, on, 516
Shoemaking, 59
Smith, Mr. E. W., on, 146
Taudevin, Mr. E. P., on, 197
Walter, Mr. C. M., on, 149, 197
Welding Tool Steel on Soft Steel, 462
Industry, The Reconstruction of, 233
Inflammability Limits of Gaseous Mixtures, 563
Institute of Metals—
Ionides, Mr. A. C., on Principles and Methods of a New System of Gas Firing, 563
Journal of the, 511
Institution of Electrical Engineers, 195
Institution of Gas Engineers—
Alteration of Articles, 60
Certification of Gas Undertakings, 60
Contribution to the Board of Scientific Societies, 104
Council Meeting, 105
Editorial Comments, 99
Gas Components Committee, 99, 416
Gas Investigation Committee, 416
Heating Symbols Unification, 106
Humphrys, Mr. Norton H., on the, 143
Membership, 101
Notes on Operating Carburetted Water Gas Plants for the Production of Blue Water Gas, 61
Refractory Materials Committee, 106
Société Technique and Wounded British Gas Men, 13, 15, 231
Special General Meeting, 60
Institution of Heating and Ventilating Engineers—
Proposed Heating Symbols, 100, 106
Research Work, 375
Inverness, Price of Gas at, 432
Ionides, Mr. A. C., on Principles and Methods of a New System of Gas Firing, 563
Iowa Gas Association, Postponement of Meeting, 20
Ireland, Peat Deposits in, 107, 165, 236
Irish Association of Gas Managers—
Ambler, Mr. F. G., on Intermittent Vertical Retorts for Medium Sized and Small Gas Works, 276, 331
Editorial Comments, 314
General Business, 328, 331
Philpott, Mr. P. J., on Exceptional Difficulties in the Administration of the Mallow Gas Undertaking, 332
Presidential Address of Mr. A. S. Brook, 271, 329
Proposed Commercial Section, 329
Visits—
Bangor Gas Works, 332
Belfast Gas Works, 331
Iron and Coal Trades Review on Coal Factors' Profits, 321
Irvine, Continuous Vertical Retort Working at, 454, 468
Isle of Thanet Gas Company, 457, 566
Isle of Wight, Coal Prices in, 118
Islington Public Lighting, 72
Italy, Natural Gas in, 483

Japan—
Chemical Industry of, 143
Sulphate of Ammonia and Other Fertilizers Trade in, 187, 268
Jedburgh Gas Company, 169
Johnstone Corporation Gas Accounts, 432
Jordan, Mr. H. W., on Registration of Directors' Names, 411
"JOURNAL," The, of Sixty Years Ago, Extracts from, 190, 377, 556
Junior Institution of Engineers Cadet Corps, 462

Kansas, Natural Gas in, 187
Keighley, High Pressure Gas for Motors at, 431
Keighley Gas Undertaking—
Benzol Plant, 33
Quality of the Gas, 167
Kelty Gas Company, 110
Kemp Combustion Products Radiator, 515
Kendal Gas Undertaking—
Annual Report, 115
Vertical *v.* Horizontal Retorts, 75

Kenilworth Gas Bill, 25
Kettering Gas Company, 390
Kilmalcolm Gas Company, 321
King and Hancock, Messrs., on the Texture of Fire Clay, 146
Kingsbury, Mr. E. F., on Colour Temperature of Illuminating Gas Flames, 70
Kingston (Surrey) Gas Company, 391
Kirkcaldy Gas Works Deficit, 78
Kitson, Mr. Arthur, on Trade Fallacies, 420
Kohr and Sperr, Messrs., on Analysis of Small Quantities of Light Oil, 409
Koppers Coke Oven Patent Litigation, 26, 200

Labour Questions (*see also* Strikes *and* Military Service)—
  Australian Gas Workers, 343
  Farm Labour and Gas Works, 456
  Gas Workers and Sunday Labour, 482, 570
  Industrial Councils, 367
  Leaving Certificates, Gas Workers and, 210, 342, 574
  Man Power Reorganization, 551
  Minimum Bonus and a Pension Scheme, 364
  Reduction of Bonus without Consent, 575
  Relations between Employer and Employed, 58
Lamps—
  Maintenance of, in Residences, 572
  Unlighted Electric, and a Collision, 189
Lancashire and Cheshire Electricity Systems, 335, 368, 412, 509
Lancashire Gas Workers' Wages, 293
Lancaster Gas Undertaking—
  Gas for Motor Vehicles, 242
  Reduction in Price, 36
  Wages Question, 293
Langholm Gas Company, 120
Lang's, Mr. John, Presidential Address to the North British Association of Gas Managers, 464
Launceston Public Lighting Question, 389
Lea Block-Rate System of Charging for Gas, 317
Lea Bridge District Gas Company, 521
Lead Restrictions, 472
Leatherhead Gas and Lighting Company, 295
Leaving Certificates, Gas Workers and, 210, 342, 574
Leeds Education Authority and Gas Fires, 32
Leeds Gas Department—
  Annual Report, 28
  Gas for Motor Traction, 435
  Wages Question, 243, 485
Leeds University Fuel Industries Department, 141
Leek Gas Undertaking, 187
Leslie, Mr. E. H., on Thermal Decomposition of Hydrocarbons, 420
Leslie Gas Company, 79
Leyland Gas Company, 292
Lichfield Public Lighting Contract, 428, 482
Liggett's, Mr. R., Experiments on Coal Gas for Motor Vehicles, 428
Light Oil, Analysis of Small Quantities of, 409
Lighting—
  Curtailment of, during the War—
    Contract Litigation, 72
    Germany and (*see* Germany)
    New Zealand and, 486
    Questions in Parliament, 72
    Street Perils, 577
  Gas, The Status and Prospect of, 551, 567
  Need for Smaller Units, 524
  Safety First, 34
  Street Specification, 457
Lights at Gas Works, 239
Limavady and the Supply of Gas for Motors, 524
Lincoln Gas Accounts, 522
Lisburn Gas Undertaking—
  Annual Report, 292
  Price of Gas, 484
  Provisional Order, 25
Littleborough Gas Company, 197
Liverpool Gas Company's Dividend, 392
Local Administration Report, 414
London—
  Gas Companies' Comparative Working Results, 318, 319
  Safety First Lighting Council, 34
London County Council—
  Fire Brigade Stations and Gas Fires, 110
  Moving a Gas Testing Station, 210
Long's, Mr. F. M., Presidential Address to the Incorporated Municipal Electrical Association, 18
Longwood Gas Company—
  Dempster-Toogood Vertical Retort Installation, 192
  Description of New Works, 190
  Staff and the War, 411
  Visit of the Yorkshire Junior Gas Association, 196, 289
Loughborough Gas Profits, 77
Lovell, Mr. R. G., on Coal Concreted from Dust and Ashes, 242
Lurgan Gas Undertaking, 483
Lye, Lighting of, 524
Lyon-Spencer Gas Containers for Motor Vehicles, 516
Lyttelton (N.Z.) Gas Supply, 291

M'Leod, Mr. J. E., on the Lea Block-Rate System of Charging Different Classes of Consumers, 317
Macclesfield Gas Undertaking—
  Glover-West Vertical Retort Results, 98, 106
  Supplies of Household Coal, 118
Machine Tools Restrictions, 61
Maclaurin's System of Low Temperature Carbonization, 68
Macon (U.S.A.), Open Construction Carbonizing Plant at, 370
Maidstone Electricity Undertaking, 509
Maidstone Gas Company—
  Annual Report, 245
  Meeting of Shareholders, 294
  Staff Changes, 367, 411
Maintenance of Gas Lamps in Residences, 572
Mallow Gas Undertaking, Exceptional Difficulties in the Administration of the, 332
Malta and Mediterranean Gas Company, 118, 161
Malton Gas Company, 294
Managers, Municipal, and Legal Recognition, 58
Manchester—
  Gas Driven Motor Cars in, 479
  Nitrogenous Products Manufacture at, 79
  Shopkeepers' Gas Requirements, 434
Manchester and District Junior Gas Association, Visit to the Staveley Coal and Iron Works, 414
Manchester Gas Undertaking—
  Annual Report and Accounts, 140, 162
  Death of an Old Official, 59
  Gas for Motor Vehicles, 479
  Prepayment Meters, 36
  Salaries and Wages Question, 74, 204, 207, 392
  Staff Change, 457
  Statistics Relating to Twenty Years' Working, 569
  Supply in the Stockport Area, 74, 290
  Uniform Working Week, 286
Manchester School of Technology and Domestic Heating Research, 345
Mansfield Gas Profits, 205
Mantles—
  Charges of Selling Spurious, 72, 200
  Condemned, 432
  Control of, in Germany, 326
Manufacture of Gas from—
  Peat, 234, 236
  Wood, 291, 471
Manufacturers, National Union of (*see* Incorporated)
Market Harborough Gas Undertaking, 166, 345
Marple Gas Supply, 346
Marriages, 59, 555
Marshall, Mr. F. D., on Low Temperature Carbonization, 517
Marylebone Electricity Department and Electric Cookers, 369, 510
Maryport, Price of Gas at, 576
Masonic, 369
Massachusetts Gas Companies—
  Managers and Legal Recognition, 58
  Proposed Legislation, 73
  Recovery of Light Oils by, 69
  Sliding Scale Question, 97, 102
Matlock Bath Gas Works, 552
Meat, Gas for Drying and Smoking, 195
Melbourne Metropolitan Gas Company, 236, 387
Melton Mowbray Gas Company, 342
Merrill, Mr. W. H., on Shut Off Valves on Gas Services, 154
Merryweather and Richmond, Messrs., on Rapid Estimation of the Strength of Sulphuric Acid, 378
Metal Melting by Gas, 210, 263
Meters—
  Gas, in America, 377
  Prepayment, Thefts from, 345
Metropolitan Gas Referees Changes, 321
Middleton Gas Undertaking, 292
Midland Junior Gas Association Annual Meeting, 109
Military Service—
  Clerks in Electric Light and Gas Offices, 237
  Exemption Applications, 36, 344, 346, 388, 520, 526, 570
  Scottish Shale Miners and, 436
Mines and Quarries Report for 1916, 554
Ministry of Munitions—
  Appeal to Gas Users, 244, 267
  Appointments, 321, 411
  Coal Gas Manufacture, 141
  Crude Benzol, Naphtha, and Light Oils Order, 412
  Gas Works and Water Gas Manufacture, 227
  Lead Restrictions, 472
  Munitions Council, 368
  Superphosphate Prices, 510
  Tar Requirements and Restrictions, 225, 267, 313, 363, 379, 409, 421, 455, 457, 547, 552
Missouri (U.S.A.) Association of Public Utilities, 317
Mitchell, Mr. C. A., on Progress of Chemistry and Gas Analysis, 23
Mogford's, Mr. J., Presidential Address to the Wales and Monmouthshire Association, 549, 557
Molieri, Heer G., on Abrupt Condensation of Naphthalene, 22
Monazite Sand in Ceylon, 368
Montgomery & Co.'s Report on the Nitrate of Soda Market, 14
Montrose Gas Company, 156, 321, 509
Morgan, Mr. A. W., on Coal Gas for Boiler Firing, 523
Morpeth Gas Company, 485
Mossley Gas Works Report, 75
Motor Fuel Production, Combined Gas and, 420
Motor Vehicles, Coal Gas for—
  After the War, 508
  Alleged Nuisance Caused by, 575
  British Commercial Gas Association and, 233
  Connections for Containers, 509, 517
  "Daily Telegraph" Engineering Observer on, 280
  Demonstration in London, 523
  Eastbourne-London Service, 375
  Editorial Comments, 266, 509
  Gas Containers—
    Connections for, 509, 517
    Improved, 280, 459, 516
    Number Supplied, 243
  Gas Undertakings and, 17, 120, 242, 327, 346, 392, 428, 435, 459, 478, 479, 519, 524, 527
  Glasgow Corporation Experiments, 428
  High Pressure Test of, 481
  "Ironmonger," The, on, 459
  Lyon Spencer Containers for, 516
  Motor Press and, 243, 514, 577
  Motor Trade Association and, 527
  Murphy's Safe Gas Storage Cylinder, 280
  Plant for Supplying, 242, 478, 479, 519, 524, 527
  Scottish Motor Traction Company's Experiments, 165, 434
  Some Suggestions, 17
  Walker, Mr. Sydney F., on, 511
Munitions Council, 368
Murder by Gas, 578
Murphy's Safe Gas Cylinder for Gas Driven Motor Vehicles, 280
Myers, Mr. E. B., on Maintenance of Gas Lamps in Residences, 572

Naphthalene—
  Abrupt Condensation of, 22
  Preventing Stoppages in Mains, 473
Nash, Mr. Albert, on Tar for Furnaces, 228
National Commercial Gas Association (U.S.A.)—
  Gas Meter Statistics, 377
  Postponement of Meeting, 20
National Gas Council—
  Editorial Comments, 453, 547, 550
  Government and Fuel Oil Supply, 547, 552
National Insurance Act Decisions, 37
National Service Reorganization, 551
Natural Gas—
  In Kansas, 187
  Italian Discoveries, 483
  Measurement of, Purchased in Bulk, 382
Naumann, Dr. A., on the Complete Gasification of Coal, 57, 67
Navan Gas Workers, 389
Negligence of Workmen, Liability for, 25
Nenagh (co. Tipperary) Gas Works, 411, 457
Nesbit and Bell, Messrs., on Silica Bricks, 515
New Inverted Gas Lamp Company, Mantle Prosecution, 72
New Jersey and the Calorific Standard, 242
New Zealand, Lighting Restrictions in, 486
Newport (Fife) Gas Company, 482
Newport (Mon.) Gas Company—
  Directors' Report, 168
  Meeting of Shareholders, 240
Newton, Mr. Thos., on—
  Domestic Hot Water Supply, 106
  Reconstruction of Industry, 233
Newton-le-Willows Lighting Restrictions, 577
Nine Thousand Cubic Feet per Ton of Coal, 459
Nitrate of Ammonia Manufacture by Electric Power at Coke Oven Plants, 226, 235
Nitrate of Soda Market, Messrs. Montgomery & Co.'s Report on the, 14
Nitric Acid from Coal Gas, 21
Nitrogen Fixation in Germany, 100
Nitrogenous Products Manufacture at Manchester, 79
Normanton Gas Company—
  Accounts, 392
  Staff and the War, 110
North Berwick, Increase in Price at, 169
North British Association of Gas Managers—
  Editorial Comments, 454, 455, 506
  General Business, 463, 514
  National Gas Testing Laboratory for Scotland, 463
  Presidential Address of Mr. John Lang, 464
  Proposed Change of the Association's Name, 514, 574
  Proposed National Gas Council for Scotland, 467, 506, 512
  Ritchie, Mr. H. G., on Continuous Vertical Retorts in a Fifty Million Works, 454, 468, 514
  Sharples, Mr. G. H., on the Dehydration of Tar, 455, 469, 513
North Middlesex Gas Company, 477
Northampton Calorific Standard Order, 23
Northwich Gas Company, 432
Nottingham Gas Undertaking—
  Increased Prices of Gas, 428, 479
  Wages Question, 486
Nuremberg Gas Works Nitric Acid Plant, 21

Official Changes—
  Beaumont, T. H., 411
  Bolton, G. H., 187
  Byron, R., 411, 457
  Carpenter, H. J., 367, 457
  Cripps, F. Southwell, 295
  Davies, Edwin, 268, 509
  Denham, John, 552

Official Changes (*continued*)—
Edwards, R. W., 289
Flannery, John, 457
Frost, Walter, 552
Grey, A. W., 367, 411
Heath, H. B., 187
Keillor, George, 141, 267
Kellock, Archibald, 268
Knight, A. R., 101
Livesey, D. T., 457
M'Lusky, John W., 59, 268
M'Naughton, W., 552
Mackintyre, D., 509
Marwick, D. T., 411
Mitchell, James, 321
Scott, R., 321
Stevenson, E. H., 295
Stewart, Archibald, 101, 267
Sugden, Wallace, 457
Turner, J. W., 187
Ward, Percy, 101
Wood, James, 509
Oil Supply and the Gas Industry, 263
Oils, Recovery of Light, in Massachusetts, 69
Okehampton Gas Company, 244
Oldbury Gas Undertaking—
Annual Accounts, 113
Consumers Demand Reduction in Price, 346
Engineer's Salary, 79
War Bonus, 117
Oldham Gas Undertaking—
Administration, 166
Gas Cooker Demand, 197
Gas Driven Motor Car, 346, 392
Salaries Question, 78
Organization—
Commercial Intelligence, 456
Gas Industry and, 11, 12
War and Industrial, 12
Ossett Gas Undertaking—
Annual Report, 115
Increase in Price, 78, 210
Manager and Local Institutions, 289
Wages Question, 526
Oswaldtwistle Gas Works Report, 167, 203
Otto Coke Oven Company Successors, 80
Oxford Gas Company, 485

P. & A. Extractors for Tar Fog, 110
Pacific Coast Gas Association, 467
Padiham Gas Undertaking, 389, 522
Parkinson, Messrs. W., & Co., 22
Parkinson Stove Company Fined for Using Copper, 382
Parliament (*see* Parliamentary Intelligence, p. viii.)
Patents—
Enemy (*see* Enemy)
Ree, Dr. A., on, 150
Peat—
Gas Making from, 234, 236
Irish Deposits, 107, 165, 236
Peel (Isle of Man) Gas Works, 411
Peel, Mrs. C. S., on Gas in the Home, 112
Pension Scheme, A Minimum Bonus and A, 364
Perouse, Making Gas from Wood at, 471
Personal Paragraphs—
Allan, A., 411
Bidwell, Captain G. W., 457
Bradbury, Lance-Corporal S., 267
Braidwood, George, 74
Broadberry, Captain E. W., 59, 101
Brown, Lieut. J. W., 15, 457
Brown, Lieut. R. O., 15
Butterfield, W. J. Atkinson, 321
Carder, C. H., 79
Casaubon, Raymond, 15
Chapman, Lance-Corporal Harold, 552
Cheshire, Captain W. Donald, 321
Chew, John, 289
Chew, W., 289
Clerk, Dugald, 367
Cohen, Lieut. A. B., 187
Cros, Louis A. M., 187
Dawes, W., 110
Drew, W. Newton, 411
Duckham, Sir Arthur, 368
Ellis, W. H., 392
Furniss, Lieut. Hilton, 411
Gandon, Harold W., 15
Ginman, R. H., 187
Glover, Samuel, 267, 290
Glover, Lieut.-Col. W. R., 552
Goldsmid, G. C., 101
Graham, Maurice, 411
Harcourt, A. Vernon, 321
Head, W. G., 321
Hoare, Henry, 59
Jordan, T. J. C., 101
Kent, Sir Stephenson, 368
Macleod, James, 367
Marsland, Percy, 556
Martin-Holland, Robert, 59, 267
Marwick, D. T., 411
Mason, T., 457
Mews, John, 101
Mitchell, Barker, 391
Moulton, Lord, 15, 367
Peebles, Lieut.-Col. W. Carmichael, 552
Pilbrow, Lieut. H. E., 368
Price, Sir Keith, 368
Ramsden, Sir John, 22
Rayner, Henry, 58
Riley, H. E., 106
Simpson, James, 367
Personal Paragraphs (*continued*)—
Smith, F. R., 22
Sospisio, Enrico, 15
Steel-Maitland, Sir Arthur, 509
Stewart, Captain J. Lennox, 187
Sully, Francis, 59
Sutor, Lieut. E., 243
Swinton, Allan A. Campbell, 141
Threlfall, Richard, 367
Topley, Captain W. H., 141
Townend, Frank Sutcliffe, 321
Trotter, A. P., 228
Troughton, Captain J. E., 59
Walker, J. Douglas, 59
Warren, Reginald H., 101
Weyman, W. G., 205
Whitelegge, Sir Arthur, 509
Wood, James W., 141
Woodward, Harold, 187
Peterborough Gas Company, 344, 367
Peterhead Gas Undertaking, 486
Petroleum Supply—
Government and, 316, 327, 366
Outlook, 409
Philpott, Mr. P. J., on Difficulties in the Administration of the Mallow Gas Undertaking, 332
Pickering, Mr. W. J., on the Calorific Value of Industrial Gaseous Fuel, 148
Pilnecek, Mr. A. E., on Large Industrial Applications of Gas, 516
Pipes—
Connections, Screwed *v.* Welded, 514
Paper, 22
Spellerizing Process for Protecting, 515
Plant Life and Gas, 556
Plymouth Gas Company—
Meeting of Shareholders, 27
Secretaryship, 187
Wages Question, 208
Pontefract Gas Undertaking, 268
Portadown, Increase in Price at, 479
Porter and Taylor, Messrs., on Primary Volatile Products of Coal Carbonization, 326
Portland Gas Works Accounts, 36
Portsea Island Gas Company, 290, 386, 485
Presentation (*see* Personal Paragraphs)
Preston, Reduction in Price at, 117
Primitiva Gas Company, 293
Provisional Orders Bill, 25, 72
Purchase Costs at Chelmsford, 208
Purifier Efficiency and the Direct Sulphate Process, 315, 322
Pyrometer, A New Optical, 555

Radcliffe and Pilkington Gas Company's Calorific Power Order, 411
Radiator, Kemp Combustion Products, 515
Radiator Heating, 411
Rahn, Mr. Bruno, on Industrial Applications of Gas, 516
Redditch Calorific Power Order, 63, 280
Reductions in Price of Gas. 36, 117, 292, 426, 570
Ree, Dr. A., on Patents, 150
Refractory Materials—
German Manufacturers' Association, 563
Hancock and King, Messrs., on Some Observations on the Texture of Fire Clay, 146
Melting Points of, 236
Working Qualities of Silica Bricks, 515
Research Work—
America and, 19
Co-Operative, 150
Domestic Heating, at the Manchester School of Technology, 345
Editorial Comments, 408
Fuel, 138, 141
Gas Investigation Committee of the Institution of Gas Engineers, 99, 416
Institution of Heating and Ventilating Engineers and, 375
Scientific and Industrial, Report of the Committee, on, 408, 417
Retorts, Vertical (*see also* Carbonization)—
Continuous, in a Fifty Million Works, 454, 468, 514
Dempster-Toogood System at Longwood, 192
Glover-West Results at Macclesfield, 106
Intermittent, for Medium Sized and Small Gas Works, 276, 331
v. Horizontal Working Results, 75
Woodall-Duckham Results, 75, 115
Rhead, Mr. T. F. E., on Some Sources of Benzene and Toluene for High Explosives, 148
Richmond and Merryweather, Messrs., on Estimation of the Strength of Sulphuric Acid, 378
Richmond, Calorific Standard Question at, 117
Ridge, Mr. H. M., on Sulphuric Acid from Zinc Ore, 284
Rippingille's Trade Mark Infringement, 26
Ritchie, Mr. H. G., on Continuous Vertical Retorts in a Fifty Million Works, 454, 468, 514
Rittman, Dr. W. F., on Synthetic Gasoline, 68
Roads and Tar Treatment, 508
Rochdale Gas Undertaking—
Annual Accounts, 113
Price of Gas, 435, 479
Romford Gas Company—
Directorate, 59
Report and Accounts, 435
Rothembach, M., on Gas from Wood, 471
Rothwell Gas Supply, 166
Rouland, M., on the Chemistry of Coal, 415
Rowell, Mr. H. W., on Co-Operative Research, 150
Rudeloff's, M., Tests of Paper Gas Pipes, 23
Rugeley Gas Company's Military Appeal, 344

St. Helens Gas Engineer's Offer, 267, 290
St. Kilda (Victoria) Electricity Supply, 482
Safety First Lighting, 34
Sales, Promoting Gas, 550, 560
Sales Department, The Industrial, 291
Salford Gas Undertaking—
Annual Report, 478
Gas Meter Prices, 345
Grant to Red Cross Hospitals, 343
Increase in Price, 37
New Loans, 435
Salisbury Gas Company—
Explosion at the Works, 431
Meeting of Shareholders, 388
Sarco Thermostatic Regulator, 515
Schaphorst's, Mr. W. F., Chart for Computing the Cost of Gas, 144
Science and Industry, American Research, 19
Scotland—
Coal Regulations in, 103
National Gas Testing Laboratory for, 463
Proposed National Gas Council for, 467
Scott, Mr. E. Kilburn, on the Manufacture of Nitrate of Ammonia by Electric Power at Coke Oven Plants, 226, 235
Scottish Motor Traction Company and Coal Gas for Motors, 165, 434
Scottish Shale Miners and the Army, 436
Scunthorpe Gas Managership, 187
Seaford Gas Company, 367, 411
Sedgley Gas Workers' Wages, 159
Selby Gas Undertaking, 168
Selkirk Gas Company, 169
Serrill, Mr. W. J., on Gas Lighting, 551, 567
Settle, Mr. T., on Ideal Carbonization, 421
Shadwell, Mr. G. C., on—
Drying and Smoking Meat by Gas, 195
Gas as a Labour Saving Agent, 152
Heating Wheel Tyres by Gas, 284
Sharples, Mr. G. H., on the Dehydration of Tar, 455, 469, 513
Sheffield, Rotherham, and Chesterfield, Proposed Joint Sewage, Water, Gas, and Electricity Board for, 392
Sheffield Corporation and the Gas Bill, 117
Sheffield Gas Company—
Bill, 72, 117
Coke Oven Gas Supply, 164
Explosion at Grimesthorpe Works, 110, 479, 576
New Works, 345
Report of the Corporation Directors, 520
Women Workers' Wages, 335
Shipley Gas Undertaking—
Calorific Power Order, 141
Charges for Gas, 79, 207, 434
Coal Supplies for Poor People, 436
Wages Question, 37
Shoemaking, Gas for, 59
Shrewsbury Gas Company, 346, 520
Sidmouth Gas Undertaking, 433
Silica Bricks, Working Qualities of, 515
Sittingbourne Gas Company, 556
Sliding Scale, Question of the Revision of—
Correspondence, 155, 237, 380
Editorial Comments, 97, 137, 313, 407, 453, 505, 547
Massachusetts Gas and Electric Light Commissioners and, 102
South Metropolitan "Co-Partnership Journal" on, 240
Valon, Mr. Arthur, on, 547, 555
Sligo Public Lighting Account, 576
Smethwick Gas Accounts, 201, 575
Smith, Mr. E. W., on Industrial Fuel from Gas Works, 146, 195
Smoke Abatement, Mr. H. Hamilton on, 229
Société Technique du Gaz en France—
Annual Meeting, 100
Foreign Honorary Members, 15
Rouland, M., on the Chemistry of Coal, 415
Stopping and Restarting a Gas Works, 234
Transactions for 1916, 70
Versepuy, M., on the Chemistry of Coal, 416
Wounded British Gas Men, 13, 15, 231
Society of Chemical Industry—
Editorial Comments, 139, 185
General Business, 146
Handcock and King, Messrs., on Some Observations on the Texture of Fire Clay, 146
Maclaurin, Mr. R., on Low Temperature Carbonizing, 68
Pickering, Mr. W. J., on the Calorific Value of Industrial Gaseous Fuel, 148
Presidential Address of Mr. Charles Carpenter, D.Sc., 145
Ree, Dr. A., on Patents, 150
Rhead, Mr. T. F. E., on Some Sources of Benzene and Toluene for High Explosives, 148
Ridge, Mr. H. M., on Sulphuric Acid from Zinc Ore, 284
Rowell, Mr. H. W., on Co-Operative Research, 150
Smith, Mr. E. W., on Industrial Fuel from Gas Works, 146
Speilmann, Dr. P. E., on Crude (Coke Oven) Benzol, 69
Walter, Mr. C. M., on Industrial Applications of Town Gas, 149, 197
Society of Architects, 242
Society of Arts—
Chairmanship, 141
Report of the Council, 15
Society of British Gas Industries, Gas Examination Prize Winners, 101
Soot and Dust, Carbonization of, 197
South Barracas Gas Company, 29

South Metropolitan Gas Company—
Accounts, 274
Co-Partnership, 73
Dividend, 187
Editorial Comments, 264, 313
Electric Light Consumers and Gas Apparatus, 413, 553
Entertainment of Soldiers by Women Workers, 474
Meeting of Shareholders, 336
Price of Gas, 37
Redeemable Debenture Stock Issue, 317
Report, 228
Sliding Scale Revision, 240
Staff and the War, 367
Women Workers, 335, 371
Working Results, 318, 319
South Shields, Increase in Price at, 76
South Staffordshire Mond Gas Bill, 382, 526
South Suburban Gas Company—
Beckenham Rate Aided Electricity Competition, 320, 365
Editorial Comments, 265
Exemption Applications, 520, 570
Meeting of Shareholders, 287
Report and Accounts, 239
Working Results, 318, 319
South West of England Association of Gas Engineers—Dunn, Mr. G. F., on a Reinforced Tar and Liquor Tank at Blandford, 279
Southend, Gas Driven Motors at, 165, 575
Southend Gas Company—
Accounts, 346
Main Damaged in Air Raid, 345
Southgate Gas Company, 485
Southport Gas Undertaking—
Calorific Power Order, 141
Wages Question, 344
Speilmann, Dr. P. E., on Crude (Coke Oven) Benzol, 69
Spellerizing Process for Protecting Steel Pipes, 515
Spenborough Gas Works—
Annual Report, 30
Public Coal Supply Question, 35
Sperr and Kohr, Messrs., on Analysis of Small Quantities of Light Oil, 409
Stafford Gas Undertaking—
Extensions, 292
High Pressure Scheme, 344
Standard Price Alteration, 237
Stanton Ironworks Company, Ltd., 571
Staveley Coal and Iron Works, 414
Stavorinus, Dr., on Gas Consumption for Various Purposes, 75
Steel, Gas for Welding Tool Steel on Soft, 462
Stirling Coal Area, 390
Stirling Gas Company's Accounts, 167
Stockport Gas Undertaking—
Annual Report, 570
Coal Requirements, 77
Cooker Demands, 295, 570
Labour Troubles, 242, 290, 482
Manchester Gas in the Area of, 74, 290
Sulphate Manufacture, 72
Tar Distilling Plant, 118
Wages Question, 386
Stourbridge Gas Undertaking Report, 164
Stoves (*see also* Fires)—
Electric—
Competition for, 554
Standardization of, 62
Gas—
And Electric, Comparative Costs of, 62
Demand for, 239
Outlook for, 140
Supply of, to Electric Light Users, 413, 553
Wright's Canteen Apparatus, 327
Stratford-on-Avon Gas Undertaking, 411
Street Lighting Specification, Electricians and, 457
Stretford Gas Company—
Calorific Power Order, 280
Meeting of Shareholders, 478
Staff Appointment, 457
Strikes—
Aberdeen, 526
Birkenhead, 389
Doncaster, 520, 570
Ilkley, 37
Stucco and Plaster Construction, Durability of, 152
Suffocation by Gas, 77, 169
Suicide by Gas, 169, 206, 576, 578 (2)
Sullivan, Mr. Leo J., on Gas Fired Boilers for the Repair of Automobile Tyres, 333
Sulphate of Ammonia—
Direct Process for the Manufacture of, Chief Alkali Inspector on, 265, 281, 315, 322, 372
Editorial Comments, 266, 315
Export Statistics, 167
For Allotments, 72
Japanese Trade in, 187, 268
Prices of, 58, 73
Questions in Parliament, 200
Tar Works and the Recovery of, 288
World's Production in 1915-16, 240
Sulphate of Ammonia Committee and Sulphate Prices, 58, 73
Sulphuric Acid—
From Zinc Ore, 284
Production of, 71
Rapid Estimation of the Strength of, 378
Summer Time, End of, 508
Sunderland Gas Company—
Calorific Power Order, 280
Gas Driven Motor, 17
Superphosphate, Prices of, 510
Surface Combustion for Welding, 462
Sutton Gas Company's Calorific Power Order, 280
Swansea Calorific Standard Inquiry, 37, 577
Sweden, Gas and Electricity Restrictions in, 427
Swiss Gas Makers' Association, 471
"System" on Gas in Business, 566

T.N.T. and the Explosives Act, 392
Tamworth Gas Company, 574
Tandragee Acetylene Gas Supply, 294
Tar—
Dehydration—
Plants, Chief Alkali Inspector and, 334
Sharples, Mr. G. H., on, 455, 469, 513
Fog—
Fisher-Fiddes Extractor for, 13, 20, 70, 110
"P. & A." Extractors for, 70, 110
For Open Hearth Furnaces, 228
Lower Temperature Carbonization and the Production of, 225, 267, 313, 363, 379, 409, 421, 473, 547, 552
Ministry of Munitions and, 225, 267, 313, 363, 379, 409, 421, 455, 457, 547, 552
Oils—
As Fuel for Engines, 527
Estimation of Toluene and Benzene in, 22
Patents, Enemy (*see* Enemy)
Products—
Maximum Prices for, in Switzerland, 554
Production in America, 296, 321
Treated Roads, 508
Works and Ammonia Recovery, 288
Taunton Gas Company, 392
Taylor and Porter, Messrs., on Primary Volatile Products of Coal Carbonization, 326
Teignmouth Calorific Power Order, 280
Temperature Colour of Gas Flames, 70
Thermal Decomposition of Hydrocarbons, 420
Thermostatic Regulator, The "Sarco," 515
Tideswell Gas Company, 208
Tipton Gas Works Accounts, 36
Tiverton Gas Works, 578
Todmorden, Gas for Motor Vehicles at, 120
Toluene from Water Gas, 23
Toluol (*see* Benzol)
Tonbridge Gas Company, 484
Toogood, Mr. G. E., on Principles of Industrial Administration, 187
Tools, Restriction Regarding Machine, 61
Tottenham Light, Heat, and Power Company—
Dividend, 144
Exhauster Governors, 208
Meeting of Shareholders, 340
Report and Accounts, 240
Working Results, 318, 319
Trade Fallacies, 420
Trade Mark (Rippingille's) Litigation, 26
Trade of To-Morrow, 195
Tralee Gas Works Extensions, 294
Tri Gas, 57, 67
Truro Gas Company, 482
Tunbridge Wells Gas Company, 344, 411, 457
Turbine, The Gas, 472
Tyres, Gas for Heating, 284

Ulverston, Price of Gas at, 485
Urban District Councils Association, 210

Valon, Mr. Arthur, on the Sliding Scale and Disappearing Dividends, 547, 555
Valves, Shut Off, on Gas Services, 154
Vegetables and Fruit, Gas for Preserving, 187
Versepuy, M., on the Chemistry of Coal, 416
Von Valois Paper Gas Pipes, 23

Wales and Monmouthshire District Institution of Gas Engineers and Managers—
Cattell, Mr. W. H., on Promoting Gas Sales, 550, 560
Editorial Comments, 549, 550
General Business, 557, 559
Presidential Address of Mr. J. Mogford, 557
Visit to the Briton Ferry Gas Works, 560
Walker, Mr. Sydney F., on Gas for Motors, 511
Wallace, Mr. R. A., on Protecting Gasholder Tanks from Ice, 17
Waller, Messrs. George, & Son, Ltd., 79
Walsall Electricity Undertaking, 205
Walsall Gas Undertaking—
Annual Report, 119
Gas for Motors, 519
Walter, Mr. C. M., on the Industrial Application of Town Gas, 149
Wandsworth, Wimbledon, and Epsom District Gas Company—
Correspondence, 473
Editorial Comments, 407
Increase in Price, 575
Meeting of Shareholders, 424, 473
Report and Accounts, 342
Working Results, 318, 319
Wanganui (N.Z.) Gas Undertaking, 390
War, The—
Gas Engineers and Staffs and, 15, 59, 110, 141, 187, 205, 243, 267, 321, 367, 411, 457
German Gas and Water Works and, 232, 272, 324, 548
Société Technique and British Wounded in France, 13, 15, 231
Warrington Gas Workers' Wages, 159
Waste, Utilization of, for Fuel, 242
Water Gas—
Blue, Institution of Gas Engineers and, 61
Dellwik-Fleischer Process, 57, 67
Ministry of Munitions and, 227
Oil Supply Outlook, 263
Toluene from, 23
Waterford, Quality of the Gas in, 119
Waterford Gas Company, 388
Wellingborough Gas Company, 390
Welsbach Light Company, 159, 202
West, Mr. John, on Increasing Tar by Lower Temperature Carbonization, 379, 473
Profiteering in Coal, 517
West Bromwich Gas Works—
Editorial Comment, 14
Increase in Price, 30
Report, 30
Wexford, Reduction in Price at, 292
Weymouth Consumers' Gas Company, 389
Whitehaven Coal Mines, Extracts from an Old Manuscript Diary Respecting, 368
Whitehaven Gas Company, 552
Whittington Gas Company, 575
Whitworth Vale Gas Company, 240
Wholesale Fittings Company's Action against a Seller of Spurious Mantles, 200
Wholesale Guarantee Incandescent Supply Stores, 432
Wigan Gas Undertaking, 484
Willey & Co., Messrs., 237
Wills, 457, 514, 566
Wilts County Gas Company, 199, 227, 239
Winchester Electricity Undertaking, 189
Winchester Water and Gas Company—
Calorific Standard Order, 187
Increase in Price of Gas, 483
Meeting of Shareholders, 483
Winmeister, Mr. C. J., on Gas Distribution at Atlanta, 516
Winmill, Mr. T. F., on Low Temperature Distillation of Inferior Coals, 461
Winter Daylight Saving in Germany, 516
Woking District Gas Company, 391, 527
Wolstanton, Slot Meter Theft at, 345
Wolverhampton Gas Company, 388
Women Workers during the War—
Bricklayers and Stokers at the South Metropolitan Gas Works, 335, 371
Glasgow Corporation and, 485
Lamplighters at Halifax, 527
Official Information as to Substitution for Enlisted Men, 508, 518
Wood—
Distillation in Canada, 291
Gas from, 471
Worcester Gas Company's Tribunal Appeal, 346
Workington Gas Undertaking Report, 115
Worthing Gas Company—
Calorific Power Order, 77, 280
Meeting of Shareholders, 484
Wright, Mr. A., on Economical Gas Consumption, 75
Wright's Canteen Gas Apparatus, 327
Wycombe Corporation Lighting Contract Litigation, 72

York Gas Works, Alleged Nuisance from, 36, 208
Yorkshire Junior Gas Association—
A Correction, 289
Visit to the Longwood Gas Works, 196

Zimmer, Mr. G. F., on Data Concerning Coke, 321
Zinc Ore, Sulphuric Acid from, 284

REGISTER OF PATENTS.

[*The names printed in italics are those of persons by whom patents have been communicated.*]

Adam, W. G —Manufacture of Ammonium Sulphate, 381
Alexander, W., and Pinchbeck, Ltd.—Dry Gas Meters, 285
Anderson, W., and Meikle, J.—
Carbonization of Coal, 474
Production of Toluol, Benzol, and other Light Hydrocarbons from Heavy Oils, 474
Ball, F. L., and Hiller, H. K.—Tar Dehydration and Ammonia Distillation Plant, 24
Bark, W. T.—Removing Carbon Deposit from Retorts, 71
Becquevort, P., and Deguide, C.—Gas Purifying Mass from Iron Scrap and Bisulphate of Soda, 334
Bloor, H. E., and Fenwick, J. B. — Hydraulic Mains, 335
Blythe, E., and Armitage, C.—Manipulating the Doors of Ovens, Furnaces, &c., 473
Bussey, C. C.—Extracting Volatiles from Coal, Shale, &c., 422
Davies, G. L.—Compositions Containing Pitch or Solid Tar Products, 473
Davis, H. N., and Twigg, W. R.—
Gas Fired Furnaces, 155, 238, 285
Regulating Fluid Pressures, 238

Day, A.—Incandescent Mantles, 335
Drakes, Ltd., and Drake, J. W.—Gravity Bucket Conveyors and Elevators, 24
Fleischer, J., and Haegele and Zweigle—Gas Heating Stoves, 474
Fletcher, Russell, & Co., Ltd., Fletcher, T. W., and Banks, W.—Atmospheric Gas Burners, 286
Grimwade, W. R.—Distillation of Tar Oils and like Substances, 335
Hall, I.—Gas Fired Furnaces, 286
Hooker, W.—Atmospheric Gas Burners, 24
Ionides, Jun., A. C.—
Gaseous Fuel Furnaces, 518
Mixing the Gaseous Constituents of a Combustible Mixture, 382
Keith, J. & G.—Gas Lighting Torch, 155, 422
Kilburn, B. E. D.—Continuous Distillation of Tar, 155
Kuhl, P. C.—Gas Turbines, 155
Lamplough, F., and Oil Extractors, Ltd.—Low Temperature Distillation of Coal, 423
Lymn, A. H., Riley, L. A., and Rambush, N. E.—Regenerators or Heat Interchangers for Gas Producer Plants, 518
Maclaurin, R.—Separating Low Temperature Tars without Distillation, 423 (2)
Main, R. B. & A. P.—Gas Heating Stoves, 286
Newell, O., and O'Byrne, P.—Gas Cooking Stoves and Ranges, 474
Proctor, W. H.—Ascension Pipes, 238
Reeves, E. A.—Mixing Gas and Air, 285
Riter-Conley Manufacturing Company—Charging Gas Retorts, 334
Sahlin, A.—Charging Producers, 155
Schollkohlen-Gesellschaft M. B. H. and Schollenbruch, A.—Treating Coke for Use with Heating Stoves, 382
Searle, W. S., and Durand, Sir E. L.—Lighting by Incandescence, 286
Semmler, C.—Utilizing Waste Heat of Gas Engines, 238
Smith, E. W.—Diaphragm for Gas Meters, 72
Société du Gaz de Paris—Gas Heating Apparatus, 422
Strassmann, P. G.—Heating Vertical Retorts, 156
Sulzer Frères, Société Anonyme—Continuous Distillation of Tar, 155
Swindin, N.—Vaporizing Oils for Enriching Coal Gases and Avoiding Naphthalene Deposition, 517
Thompson, H.—Gas Ovens and Cookers, 155
Tilley, F. C.—Gas Heated Soldering Iron, 473
Turner, E.—Gas Burners, 474
Wellington, S. N.—Destructive Distillation of Carbonaceous Substances, 381
Werner, E. E.—Indicating the Volumetric Flow of Gases, 518
White, A. H.—Charging Gas Retorts, 334
Wilson, J., and Parkinson and W. & B. Cowan, Ltd.—Wet Gas Meters, 381
Wilson, J. H. & G.—Coin Operated Gas Meters, 71

Ammonia Distilling and Tar Dehydration Plants—Ball, F. L., and Hiller, H. King, 24
Ammonium Sulphate, Manufacture of—Adam, W. G., 381
Ascension Pipes—Proctor, W. H., 238
Burners, Gas—
Fletcher, Russell, & Co., Ltd., Fletcher, T. W., and Banks, W., 286
Hooker, W., 24
Turner, E., 474
Carbon, Removing, from Retorts—Bark, W. T., 71
Coal, Carbonization of—Anderson, W., and Meikle, J., 474
Coal, Distillation of—Wellington, S. N., 381
Coal, Low Temperature Distillation of—Lamplough, F., and Oil Extractors, Ltd., 423
Coal, Shales, &c., Extracting Volatiles from—Bussey, C. C., 422
Coke, Treating, for Use with Heating Stoves—Schollkohlen-Gesellschaft, M. B. H., and Schollenbruch, A., 382
Conveyors and Elevators, Gravity Bucket—Drakes Ltd., and Drake, J. W., 24
Cooking Stoves and Ranges—Newell, O., and O'Byrne, P., 474
Diaphragm for Gas Meters—Smith, E. W., 72
Doors of Ovens, Furnaces, &c., Manipulating the—Blythe, E., and Armitage, C., 473
Engines, Utilizing the Waste Heat of—Semmler, C., 238
Fires, Gas Rings for—Main, R. B. & A. P., 286
Flow of Gases, Indicating the—Werner, E. E., 518
Furnaces, Gas Fired—
Blythe, E., and Armitage, C., 473
Davis, H. N., and Twigg, W. R., 155, 238, 285
Hall, I., 286
Ionides, Jun., A. C., 518
Heating Stoves—Société du Gaz de Paris, 422
Hydraulic Mains—Bloor, H. E., and Fenwick, J. B., 335
Incandescence, Lighting by—Searle, W. S., and Durand, Sir E. L., 286
Low Temperature Distillation—
Lamplough, F., and Oil Extractors, Ltd., 423
Maclaurin, R., 423 (2)
Mantles—Day, A., 335
Meters—
Diaphragm for—Smith, E. W., 72
Dry—Alexander, W., and Pinchbeck Ltd., 285
Prepayment—Wilson, J. H. & G., 71
Wet—Wilson, J., and Parkinson and W. & B. Cowan, Ltd., 381
Mixing Gas and Air—Reeves, E. A., 285
Mixing the Gaseous Constituents of a Combustible Mixture—Ionides, Jun., A. C., 382
Naphthalene Deposits, Avoiding—Swindin, N., 517
Oils, Vaporizing, for Enriching Coal Gases and Avoiding Naphthalene Deposition—Swindin, N., 517
Ovens and Cookers, Gas—Thompson, H., 155
Pressures, Regulating—Davis, H. N., and Twigg, W. R., 238
Producer Plants, Regenerators or Heat Interchangers for—Lymn, A. H., Riley, L. A., and Rambush, N. E., 518
Producers, Charging of—Sahlin, A., 155
Purifying Mass from Iron Scrap and Bisulphate of Soda—Becquevort, P., and Deguide, C., 334
Retorts, Charging—White, A. H. (*Riter Conley Manufacturing Company*), 334
Retorts, Vertical, Heating of—Strassmann, P. G., 156
Soldering Iron, Gas Heated—Tilley, F. C., 473
Stoves, Heating—
Fleischer, J., and Haegele & Zweigele, 474
Société du Gaz de Paris, 422
Tar Dehydration and Ammonia Distilling Plants—Ball, F. L., and Hiller, H. King, 24
Tar Distillation, Continuous—Kilburn, B. E. D. (*Sulzer Frères, Société Anonyme*), 155
Tar Oils, Distillation of—Grimwade, W. R., 335
Tar Products, Treatment of—Davies, G. L., 473
Tars, Low Temperature, Separating without Distillation—Maclaurin, R., 423 (2)
Toluol, Benzol, &c., Production of—Anderson, W., and Meikle, J., 474
Torch, Lighting—Keith, J. & G., 155, 422
Turbines, Gas—Kuhl, P.C., 155

Applications for Patents, 25, 72, 119, 156, 197, 245, 286, 346, 382, 434, 474, 518, 577

CORRESPONDENCE.

Aconcagua—The Adulteration of Gas Coal, 24
B.Sc.—
Curphey, Mr., and Tar Dehydration Plants, 334
Increasing Tar by Lower Temperature Carbonization, 380
Blundell, J. E.—The Low Temperature Fiasco, 421
Campbell, A. S.—Re-Issue of Debentures, 381
Enquirer—Preventing Naphthalene Stoppages in Mains, 473
Fisher, J.—Elimination of Tar Fog, 110
Gas Engineer—Increased Tar Provision, 379, 473
Humphrys, N. H.—Adulteration of Gas Coal, 70
Hunt, Charles—The Question of Sliding Scale Injustice, 380
Jones, H. E.—The Wandsworth Meeting and the Sliding Scale, 473
Jones, R.—Sulphuric Acid, 71
Kenshole, J. E.—Vagaries of Government Departments, 285
Marshall, F. D.—
Elimination of Tar Fog, 70
Low Temperature Distillation of Inferior Coals, 517
Nemo—Coalite, 110
Notanda—Great Expectations at Low Temperatures, 421
Oikonomia—The Sliding Scale Question, 155, 380
Perplexed Secretary—Re-Issue of Debentures, 334
Settle, T.—Race for Ideal Carbonization, 421
Smith, E. W.—Determining the Gas Production Goal, 237
Swain, Leo—Motor Gas Container Connections, 517
Taudevin, E. P.—Construction of Gas Furnaces, 197
Taylor, J.—Increasing Tar by Lower Temperature Carbonization, 380
Valon, A.—Gas Light and Coke Company and Standard Price Alteration, 237
Watson, R.—Price of Gas at Doncaster, 24
West, John—
Increasing Tar by Lower Temperature Carbonization, 379, 473
Profiteering in Coal, 517
Woodall, H.—Coal Controls, 334

Carbonization, Ideal, Race for—Settle, T., 421
Coal, Gas, The Adulteration of—
Aconcagua, 24
Humphrys, N. H., 70
Coal, Profiteering in—West, J., 517
Coal Controls—Woodall, H., 334
Coalite—Nemo, 110
Debentures, Re-Issue of—
Campbell, A. S., 381
Perplexed Secretary, 334
Doncaster, Price of Gas at—Watson, R., 24
Furnaces, Gas, The Construction of—Taudevin, E. P., 197
Gas Light and Coke Company and Standard Price Alteration—Valon, A., 237
Gas Production Goal, Determining the—
Ed. "G.J.," 285
Smith, E. W., 237
Government Departments, Vagaries of—Kenshole, J. E., 285
Low Temperature Distillation of Inferior Coals—Marshall, F. D., 517
Lower Temperature Carbonization (*see* National Gas Council)
Motor Gas Container Connections—Swain, Leo, 517
Naphthalene Stoppages, Preventing—Enquirer, 473
National Gas Council and Lower Temperature Carbonization—
B.Sc., 380
Blundell, J. E., 421
Gas Engineer, 379, 473
Notanda, 421
Taylor, J., 380
West, J., 379, 473
Sliding Scale Question, The—
Hunt, C., 380
Oikonomia, 155, 380
Valon, A., 237
Sulphuric Acid—Jones, R., 71
Tar Dehydration Plants, Mr. Curphey and—B.Sc., 334
Tar Fog, The Elimination of—
Fisher, J., 110
Marshall, F. D., 70
Wandsworth Meeting and the Sliding Scale—Jones, H. E., 473

LEGAL INTELLIGENCE.

"Acri-Flavine," Application to Manufacture, 111
Coke Oven Patent Applications, 26, 200
Copper, Fine for Illegal Use of, 382
Dyes, Coal Tar, Applications with Reference to, in the Patents Court, 111, 239
Electricity, Preferential Charges for, 157, 198
Gas Light and Coke Company, Damages against, for Workmen's Negligence, 25
Hackney, Alleged Preferential Charges for Electricity at, 157, 198
Haywards Heath and District Gas Company, Ex-Secretary of, Sentenced for Forgery, 111
Hythe Gas Company Summoned for Excessive Lighting, 239
Kimber *v.* Gas Light and Coke Company, 25
Koppers Coke Oven Patents, 26, 200
Levenstein, Ltd., Applications by, Regarding Coal Tar Dye Patents, 111
Lighting Contracts and the War, 72
Lights at a Gas Works, Summons as to, 239
Mantles of Enemy Origin, 432
"Nico" Mantles, Spurious, 72
Parkinson Stove Company, Ltd., Fined for Illegal Use of Copper, 382
Preferential Charges for Electricity, 157, 198
"Rhodamine," Application to Void the Trade Mark of, 111
Rippingille's Albion Lamp Company, Ltd., *v.* Clark's Syphon Stove Company, Ltd.—Trade Mark Infringement, 26
Simon-Carvès, Ltd., Application by, to Manufacture under the Koppers Patents, 26, 200
Usick, B., and Spurious "Nico" Mantles, 72
Wholesale Fittings Co., Ltd., *v.* Bernstein, 200
Wholesale Guarantee Incandescent Supply Stores and Enemy Mantles, 432
Wilts County Gas Company, Ltd., 199, 239
Workmen, Liability for Negligence of, 25
Wycombe Corporation and Payment for Lighting during the War, 72

PARLIAMENTARY INTELLIGENCE.

Ashton Chemical Works Explosion, 335
Bills Royal Assented, 111
Clerks in Electric Light and Gas Offices, 237
Coal Industry, State Control of the, 111, 285
Coal Supply in France, 111
Coke, Method of Sale of, 285
Creosote Oil Restrictions, 285
"Jena" Glass, 156
Kenilworth Gas Bill, 25
Lighting Restrictions, The, 72
Lisburn Provisional Order Bill, 25
Provisional Orders Bill, 25, 72
Sheffield United Gas Company's Bill, 72
Sheffield United Gas Company's Women Workers, 335
South Metropolitan Gas Works, Women Workers at the, 335
South Staffordshire Mond Gas (No. 2) Bill, 382
Sulphate of Ammonia Prices, 200
Willey & Co., Messrs., 237
Women Bricklayers at the South Metropolitan Gas Works, 335
Women Workers with the Sheffield Gas Company, 335
Workmen's Compensation Payments, 111

Progress of Bills, 209

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EDITORIAL NOTES.

The Threatened Dissolution of Unity.

IT does not necessarily follow that because for the moment there are no visible ripples on the surface of the pool of affairs relating to organization in the gas industry, there is no life underneath ; nor does it follow that, though proceedings are removed from the present gaze of those concerned, the results of schemings in connection with organization and headquarters will be acceptable to the whole industry. After what has happened, there will be in many places a very close scrutiny of whatever is put forward, and from whatever quarter. It is abundantly clear that for the gas industry in regard to these matters a critical time has set in, just when its ranks ought to be closing-up into solid formation for the purpose of attacking the work that lies before. It is quite the traditional way of the industry to be doing something that is inimical, or neglecting something that is necessary, to its vital interests. But it had been devoutly hoped that, rubbing shoulders as we are now doing with momentous progressive developments, the old element of stubbornness against complete organization of forces would have died a natural death, and that the very people who clog the wheels that were moving to the maximum attainable security for the industry would before this have been ranked among the most earnest advocates of the largest measure of unification. On them rests grave responsibility—to-day more than ever. This is said with knowledge. Our previous articles on the subjects of organization and headquarters have brought us opportunities of ascertaining the views of men in the industry who have considered these matters as questions of policy in relation to the conditions of to-day, rather than as principles that are old and corroded and altogether out of keeping with the changed times. As a result of these opportunities, we are sorry to say that serious cracks are found in what had already become a fairly good concrete foundation to the organization of the industry. It is felt a warning must be uttered, because, unless there is adroit handling of the situation, support will be withdrawn from the organized effort which it has cost so much thought and labour to build up; and this withdrawal of support may come from not only one section of the industry—just when most and so urgently needed, and just when it will be a heavy sacrifice to lose even a part of it. The saving of the position may be summed up in the word "comprehensiveness," which comprehensiveness can do no one harm, but the whole industry much good.

When writing upon "The Muddled Building Scheme," we spoke the other week of the members of the Society of British Gas Industries, and the absurd setting-up at the financial point of a boundary to co-operation with them, and debarring them from participation in the activity at the centre of operations. The same in the headquarters' scheme. It was also pointed out by us that there are people in the gas supply industry who feel there is a question of honour here, who feel that having taken the Society into partnership so far, the seal of completeness should be put upon it; and there is a determination among them that, whatever the recommendations, they will have nothing to do with anything that is tantamount to a breach of faith. The suggestion was made in the same article that it would be a good thing, if there is a substantial case to be put forward for drawing the line at some point short of full co-operation, to make it known, so as to have a settlement of the uncertainty, instead of letting the present singular position continue to be masked by an undignified silence. The challenge remains unanswered; courage fails to raise its head from the profound silence. Why the reticence? Why the fear? Courtesy has its claims; and so have past co-operation and partnership the right to a full explanation. Men's voices are heard avowing the belief that, though there is weighty evidence that the necessities of the industry demand the bonds and influences of stronger organization, sufficient unity and collaboration are possible under a system of segregation. But they fail to show why there should be segregation, or how the most effective co-operation and collaboration can be obtained by association in the precincts, but not in the internal parts, of organization. Our Army is a complete organization of several parts; but its efficiency as a fighting force would be greatly impaired if a single part was left unattached. The fullest co-operation and collaboration cannot be realized without the closest unity of every necessary element.

And those who make the plant by which gas is produced, purified, and stored, and by which the residual products are dealt with, and the appliances by which the gas is consumed, are an essential element in any constitution or in any movement that aspires to represent the whole industry. Without the plant the gas cannot be made and the residuals handled; and the appliances by which gas is consumed are as necessary to the gas business as the gas itself. Yet there are those who make and sell gas—thank goodness there are few with such narrow minds—who say that purchasers and sellers ought not to associate in a central organization. If this were the opinion of the whole industry, then we would say no more; but it happens not to be. It is certainly not the opinion of many men of sound judgment who make and sell gas, and who regard the opinion as a sign of miserable weakness. If it were the general view, then, without further controversy, we should say (despite the many years during which we have endeavoured to stimulate action in perfecting the industry's organization in order to invest it with the maximum realizable power) better far to have perfection in separation than attempt to cause cohesion among what were so universally adjudged to be incompatibles. But fortunately it is not the general view; and therefore we do urge those who feel aggrieved not, until it is seen how things actually shape, to do anything that will help to wreck the degree of organization which has been so far achieved. We cannot help believing that, although there is a small part of the members of the gas-supply industry who think that it is quite impossible for purchasers and sellers to associate, and who ought in consequence themselves to be shunned by every gas consumer and every patron of their secondary products, the time will come when they will see that the truest interests of the gas industry will be best promoted by the intimate association of those who make gas-manufacturing plant and gas-consuming appliances and those who make gas. The one is necessary to the other, the one is equally important as the other, in the march of development. Progress achieved by collaboration is much more important than persistence in the petty attitude as to the impossibility of any true cohesion between buyers and sellers. Buyers and sellers, what of? Technically made products! Products by which the common interests are mutually advanced. But the makers of the one product, so it is submitted, cannot associate with the others—only so long as it suits their convenience. We cannot see a rational side to this argument; and in like case are many others in and of the gas-supply industry who are ardent for the best means of advancing its interests. With all sincerity we do urge upon everyone in the gas industry not to let the unity so far achieved be dissolved, if by going only a little further, absolute unity of forces, of endeavours, and of good feeling (which alone is worth much) can be assured.

Coal Redistribution and the Price Limitation Act.

The last "job" any man in his right senses would desire to take up, unless in the interests of the country at a time of exigence like the present, is that of Coal Controller; and by the day that Mr. Guy Calthrop has done with the work of endeavouring to harmonize supplies, conveyance, and requirements, he will have had an unrivalled experience in effort to placate discontent and to bring within parallel lines interests that widely diverge. He is working on new ground, and under conditions that are about as obstructive to smooth procedure as anything could possibly be, which, of course, is the very cause of his appointment. We can only admire the courage of Mr. Calthrop, and admit to harbouring no trace of envy of him in his gigantic task. It is probably a good thing for the nation that he himself was not pre-informed as to the magnitude of what was before him, or he might have declined the invitation to undertake the service. However that is a reason for making the Controller's task as light as possible, by every coal user doing his part to try to aid in securing a success for the schemes devised by him in collaboration with men of experience in the different applications of coal.

The Coal Controller has recently addressed the members of the Incorporated Municipal Electrical Association much the same as he did previously the members of the Institution of Gas Engineers. There is one thing very clear from the later statement and appeal; and it is that Mr. Calthrop's opinion has decidedly hardened as to the difficulties of securing supplies next winter owing to the inadequacy of conveyance in relation to requirement. If, he said, the war were to end to-morrow, the transport difficulty would not cease next winter, and, as a matter of fact, the difficulties will any way be aggravated. These words contain in them a depth of gravity which no coal user can afford to ignore; and although the electricity industry—including electric tramways and railways—uses less than seven million tons of coal a year, the Coal Controller, on the principle that every little helps, appealed to electrical engineers to adopt every means to reduce their consumption of coal, and to stock so as to save winter transport as much as possible. Of course, if the electricity undertakings can fit their boilers for the use of coke, or a lower grade fuel than the coal ordinarily used (such fuel being procurable) they can render aid in this way; or, without specially fitting some of their boilers, if there is plenty of spare steam power, they can still use inferior fuels. Otherwise, their help in alleviating next winter's traffic difficulties must be limited to fuel stocking in summer. In passing, there is one point in Mr. Calthrop's remarks to the electricals to which we may refer. He confesses that he is not a technical man other than in railway matters; and, this being so, excuse can be made—unless it is a case of misreporting—for such a statement from him as "electrical undertakings represent the most efficient coal "users in the country." The electrical engineers present must have been mightily tickled over this, as there flashed across their minds the data as to the amount of thermal value that goes into their boiler furnaces, and the resultant exiguous thermal value that is available at the consumers' terminals. Nor would the Ministry of Munitions be satisfied, in view of their requirements, to regard the electrical undertakings as the "most efficient users" of coal in the country.

Among the qualifications for a Coal Controller is the capacity for parrying awkward questions; and there were some thorny ones put at the meeting of the electrical engineers, who did not expect Mr. Calthrop to sit and listen to any long rambling speeches incorporating merely speculative and personal views having little bearing on the points of imperative necessity, and the satisfying by prevision of the needs of the country when these needs will be at the maximum, and the means of meeting them at their minimum capacity. The most interesting of the inquiries had reference to the operation of the Price of Coal (Limitation) Act under the working of the coal-redistribution plans which the Coal Controller has before him. The Act and his plans appear to have an uncompromising relationship. In the newly issued conditions as to the sale of coal, which are dated June 28, it is directed that "no coal shall be sold by collieries for con-"sumption in the United Kingdom except at the maximum "price under the Price of Coal (Limitation) Act," which direction appears to be at variance with the intention of the Act, which was to fix a maximum without binding generous coal owners to charge less if they found it possible, and were willing. But here the decree runs: "No coal shall be sold ". . . except at the maximum price," &c. However, that by the way. The interesting point raised by the electrical engineers is as to how the Controller's redistribution schemes are going to be brought into harmony with the Price Limitation Act; for under these schemes he is going to sever quondam contractors and customers, and alter the conditions on which coal was purchased in the twelve months ending June 30, 1914, which conditions are fundamentally essential to the operation of the Act. This is a matter on which Mr. Calthrop was evidently unprepared with a reply; for he suggested that it was one which should be brought to his notice in specific cases of hardship. Another point was whether, if buyers were put to additional expense owing to the operation of the re-organization scheme, the Government would compensate them for the difference. The retreat from this question was the obvious one that the Coal Controller has enough to do in other directions without being saddled with financial obligations of the kind.

But an equally, if not more, important question is as to the values of the coal which the redistribution will bring to users. The coal for steam users may be of lower value in respect of calorific power and ash; and consequently more would have to be used, and probably more boiler power would be required. For gas making the coal may be less valuable; its coking qualities may not be so good; and the volatile matter may be such quantitatively and qualitatively that results in other secondary products will suffer. These are important questions from the monetary point of view; but commonsense should indicate that there cannot be this general geographical rearrangement of the supplies without some adverse effects are felt. It is obvious that in such times individual interests must give way to the general welfare. This, however, is a further matter on which nothing definite could be said by the Coal Controller. But there is the question of cleaner coal. The adulteration of coal by the inclusion in it, and the sale at the price of honest coal, of useless material—subjects treated upon in a communicated article and an editorial in the "Journal" for June 19—are both serious questions just now, when in every direction the handling of such material means to the country uneconomy and a dead-loss of efficiency. Mr. Guy Calthrop was asked if he could do anything to get cleaner coal; and his reply was that he would assist in dealing with complaints if furnished with the names of collieries from which the dirtier coal came. This so far may be satisfactory. But as to the problem of how to bring about friendly relationship between the Price of Coal (Limitation) Act and the coal redistribution scheme, the solution, if found, has not been divulged.

Munitions—War and Industrial.

A graphic story was told in the House of Commons last Thursday by Dr. Addison, the Minister of Munitions, regarding the wonderful organization—created by hard work and perseverance—of which he is the Government head, and which is a manifestation of the capacity and indomitable will of the country when "put to it." Into the details which he narrated as to the ramifications, output, and resources of the department, we cannot enter; but the fact that he spoke so freely, and opened to the gaze of the enemy so much that is anything but "contemptible," reveals a confidence in the position which will be very far from pleasant reading by the Central Powers. Among much else, Dr. Addison told how the capacity for the production of high explosives in March, 1917, was four times more than that of March, 1916, and twenty-eight times as great as that of March, 1915. This is a remarkable achievement, and not only so, but one which should for ever stand in the history of the war to the credit of the participants. We know very well in the gas industry that, if need be, the cited figures could be further enlarged. For the ungrudging service that has been rendered by men in the organization of work that has enabled this country to counter, with rapidity and powerfully, the years of careful systematic preparation for war by the Central Powers, there was acknowledgment by the Minister. Prominent among the names are those of Lord Moulton, Sir Arthur Duckham, and Sir Stephenson Kent. But though high explosives were at the front of what this country and her Allies lacked at the beginning of the war, and though the gas and coke-oven industries set-to with right good will to supply the deficiency, and to enlarge the stream of output until it had swollen to the sufficiency which empowered Dr. Addison to quote the extraordinary figures that he did as to production, not once in this part of his speech

did he specifically refer to the industries that are the sources, and that when appealed to so energetically put forward their strength. True he had much material for the speech; but the gas and coke-oven industries are not insusceptible to a little pat on the back, any more than are individuals. Probably Dr. Addison intended the gas industry to understand it was included in the reference to chemical industries. But whether or not that be so, our remonstrance is justified by the disappointment on the part of Sir William Pearce with the pittance of tribute paid to the chemical industries.

However, there are other parts of the speech in which the gas industry is directly concerned, as they bear not only upon the present but the future of the industry's economic situation. The home position of sulphate of ammonia is well known to-day; its future is not. It is all going to resolve itself into a question of cost of production, which will after the war govern commercial supremacy. The Ministry of Munitions takes some credit to itself that the country is, without large importations, provided as well as it is with fertilizers. Quite apart from sulphate of ammonia from gas-works and coking plants, the department has been fostering the production of cyanamide, as well as the utilization of nitrogen from the air. A great lesson has been learned from Germany, which is absolutely independent of nitrates from Chile through the inexhaustible atmospheric source of nitrogen. It is the intention that in future this country shall have less reliance upon the overseas source of supply. If sulphate of ammonia produced by the carbonization of coal is going in the time to come to suffer depreciation in market value, it is certain that nitrate of soda will be in still worse case. The time is undoubtedly coming when there will be keen competition in the fertilizer markets at home; but keener still will be the competition with Germany in the overseas markets.

In this connection after the war there ought to be cheaper sulphuric acid than before. Its production has through war requirements undergone large development in both private and Government factories. "Whatever arrangements," remarked Dr. Addison last week, "are made for "the future, it is essential to secure that sulphuric acid is "made available to *bonâ fide* users at fair rates; for if this "is done it should lead to the establishment of an impor-"tant group of new industries." Sir William Pearce, as an old sulphuric acid maker, does not at all like the position of things. He sees an after-war redundancy. There will be, he supposes, at least 400,000 to 500,000 tons of sulphuric acid available, "which will be too much for the country." The complaint is one with which the Ministry of Munitions is very familiar, states the Parliamentary Secretary to the Ministry (Sir Worthington Evans). Trust the chemical manufacturers for always being on the scene betimes, and looking after their own interests! The gas industry knows them and their methods, and the avenues of approach which parliamentary representation gives. The Ministry, says Sir Worthington, is already in consultation with the trade affected, and will continue in consultation, with the view of getting a scheme elaborated which, without sacrificing Government assets, will do no injustice to those who were in the business before the Government came in. It may be suggested that the department might, in order not to be one-sided in the counsel received and in its consequent action, also take into consultation those who are users of sulphuric acid, and who have long experience not only of the sulphuric acid market, but of certain purchasing methods of some of the chemical manufacturers, and of their love for self-protection. To return to Dr. Addison's speech, it is further noted that he can offer no prospect of better supplies of steel to private users. The output has been increased; so much so that after the war the country will fortunately find itself with a capacity for steel production 50 p.ct. greater than before the war. Sight, too, must not be lost by an industry dealing in industrial power and heating, of the fact that the Ministry of Munitions is concerning itself in the provision of cheaper power and the utilization of inferior coal.

But through the work of the Ministry of Munitions perhaps more than any other Government department, there has been an awakening to the country's several industrial defects, and to the fact that the Germans had got control of, at any rate the upper hand over, industries or parts of industries that are vital to the progress of the war and to the maintenance of improved peace industries. But reaction is not going to be tolerated; and the Government appear to have made up their minds that the country is going to duly benefit by its dearly won lessons, and by the profitable utilization of the equipment that it has brought into being for the immediate purposes of the war. That is all good. Industries have made mistakes, have been lethargic, and have been negligent. But the Government have not to look far to find that within their own limits there have been mistakes which are accountable for many a tragic tale. There have been mistakes, too, of a legislative kind; and one of the important lessons that the Private Bill Authorities have yet to learn is that it is a dangerous thing to interfere, by restrictive legislation, with the natural development of industries. Where would the country and her Allies have been to-day had it been impossible for the gas industry to have developed its processes for dealing with secondary products? Never before has there been such severe and substantial condemnation of parliamentary interference with the industry's development. Large plants have been erected at Government request, much capital has been expended, much work has been done. The pampered and protected chemical industries could not have saved the country from defeat, as the industries engaged in coal carbonization have done. It is not the old gas industry that will have to be dealt with after the war, but a gas industry made what it has been by the requirements of the war, and by the lessons of which all intelligent men intend to take advantage. There may be a few obstructives; but the country is in no mood for a repetition of their tactics.

Wounded British Gas Men in France.

International alliances and covenants ratified by, and bearing the seals of, great Powers are instruments of vast importance to the world, providing their keeping is in the hands of honourable men. But there are acts of less formal kind—acts prompted by the heart—which are the best evidences of a genuine bond of human sympathy and friendship. One such evidence has lately been received by the President of the Institution of Gas Engineers (the Right Hon. Lord Moulton) from the President of the Société Technique du Gaz en France (M. Rouland), which will be profoundly appreciated by members of the British gas industry. From the ranks of the British gas industry, there have gone considerable numbers of men to fight side by side with the sons of France. Many of these men have, in their devotion to honour and country, lost their lives; others have been maimed or wounded, or otherwise incapacitated. Some of these are probably lying suffering in hospitals in France. M. Rouland moved not only by the alliance between the two great Powers, but by humane and fraternal feelings, pledges himself (as will be seen by the correspondence published elsewhere in this issue) and his colleagues of the Société Technique to do all that may be possible in the way of personal visits and providing means of alleviating the conditions of such officers and men. But this kindly intention cannot be carried out unless they are furnished with the names and other particulars of the officers and men—not omitting to mention the undertakings in whose service they were prior to the war, and the hospitals where they are now to be found. To Mr. Walter T. Dunn, Lord Moulton has very properly delegated the task of compiling such a list; and for this purpose the officers of every gas undertaking with, or the relatives or other friends of, men lying wounded or otherwise ill in the hospitals of Paris or the Provinces are requested to communicate the necessary information direct to Mr. Dunn as early as possible. Lord Moulton has dispatched a message to M. Rouland, on behalf of himself and the Institution of Gas Engineers, stating how deeply he and they are touched by this sympathetic thought, and expressing grateful thanks. Already strong ties exist between the gas professions of France and this country; but this kindly desire to make the wounded men of the British gas industry feel that they are near to and cared for by friends in the French gas industry will still further tighten these ties.

Tar-Fog Extraction and Oil-Washing.

Formerly it was thought that tar-extractors of well-known types were efficient for preventing the clogging of scrubbers by tar and the detrimental effect by it upon other parts of the gas-manufacturing process. But since, with the advent of oil-washing, it has been found that a higher efficiency in the pre-removal of tar fog is a distinct advantage to both the process and to the

wash-oil. In later columns this week, we describe and illustrate a method of tar-fog elimination patented by Messrs. Fisher and Fiddes, of Tottenham, which has, tests indicate, a very high efficiency relative to the old tar-extractors. An average extraction, under Tottenham conditions, of 33·5 gallons per million cubic feet of gas is a figure that not only speaks of efficiency, but of ingenuity in the devising of the new method, which can be simply, conveniently, and, in view of the results, inexpensively applied. There is no reason why the services of the new extractor should not be utilized on the smaller works as well as on the larger ones. Several of the former have gone into oil-washing because they want to do their maximum part in the service of the country, while others for commercial considerations will follow the practice as soon as possible. For all works, no matter the size, it is clear that trouble will be saved, and efficiency will be enhanced, by taking the route that leads to the elimination of tar fog in the most complete manner. Gas engineers generally will be interested in the data we give in the descriptive article as to experiences at the Tottenham Gas-Works, where the Engineer and General Manager of the Company (Mr. A. E. Broadberry, M.Inst.C.E.), has had the arrangement under trial, with the beneficial results recorded.

The Incidence of the Increase in Price.

A question of considerable difficulty for the responsible officials of gas undertakings when preparing their budgets, and finding themselves faced with a large increase of expenditure, is to determine on which branches of the business, and by how much, the charges should be advanced in order to provide sufficient revenue to counterbalance the augmented outgoings. Where there are long-period contracts and a coal clause, the difficulty is not great as to what should be done; and, in normal times, upon all other classes of consumption, it is easy enough, if the prices of the competing agents will allow, to arrange for something in the nature of a *pro ratâ* increase. But in these times other considerations may prevail, if there is a fair assurance that permanent injury will not result. In considering an increase of price for gas, with extraordinary war charges for materials and labour to be met, it is fair to take into account the relation to actual costs of the revenue derived from the different sources of business, and to put the larger part of the increase upon the least profitable branches per 1000 c.ft. If the lighting business is paying well under present conditions, and the manufacturing consumption is not, then it is quite fair—more especially as the latter is productive consumption—for the industrial business to bear a large part of (perhaps the whole of the) increased cost. This may savour of a reversal of the advocated policy of encouraging the daylight load. There is no such intention.

Temporary Expediency and Exceptional Circumstances.

There is a question here of temporary expediency under exceptional circumstances. In factories that have been turned over to munitions work, the day load frequently now (excepting perhaps in the summer time) runs far into the lighting hours. Such factories are, as a rule, doing extraordinarily well; and their power and heating agents are serving their profit-making. At the moment, competition between gas and other power and heating agents is not a very serious question as in ordinary times, when the electricity purveyors, finding themselves hard-pressed in the competition, have to sell energy for power and heating at figures that are but the shadows of those they charge for lighting. They would not do this unless compelled by the circumstances that a horse-power-hour requires approximately 0·75 unit, and that the thermal value of a unit is only 3420 B.Th.U. Just now electrical undertakings are in the same state as gas undertakings. Unless the extra supply is needed for munition purposes, they cannot get money for extensions; and, like gas undertakings, it depends greatly on their internal financial conditions as to whether they can do anything much in the way of extending business on the district. Current conditions can therefore be brought into account, as well as equity and expediency, in considering the question of the incidence of increased charges.

The Case of West Bromwich.

Take West Bromwich as a case in point. There the Engineer and Manager (Mr. W. H. Johns) has been considering the position, in conjunction with the Borough Treasurer (Mr. H. Kirk). It is estimated that the expenditure of the gas undertaking will amount to roughly £5000 more this year than last, after deducting increased coke receipts (the details can be seen elsewhere in this issue). On the total sale this is equal to 3d. per 1000 c.ft. The prices for lighting, according to quantity, at present range from 2s. 7d. to 3s. per 1000 c.ft., less 5 p.ct.; and for prepayment supply, the charge is 3s. 6d. For power and other manufacturing purposes for less than 200,000 c.ft. 2s. 1d. is charged, for above 200,000 c.ft. 1s. 10d., both less 5 p.ct. Last year the total cost of gas, after deducting the income from secondary products, was equal to 1s. 10·43d. per 1000 c.ft.; and with interest and sinking fund, the inclusive cost was 2s. 4·48d. The average price obtained for motive power and manufacture was 1s. 10·46d. Now having regard to the facts that there was a net profit last year of £3011, that rather less than 36 p.ct. of the consumption was for manufacturing purposes, and that about 86 p.ct. of the manufacturing consumption was sold at 1s. 10d., it is clear that the lighting consumers are, under present conditions, already through their charges doing their fair share, and are the ones who provided the net surplus last year. This being so, Mr. Johns, in collaboration with the Borough Treasurer, advised the Gas Committee (who have agreed) to alter the incidence of the scale by raising the charges for manufacturing purposes and bringing them closer together. The price will now be 2s. 4d. per 1000 c.ft. for less than 1 million c.ft., and 2s. 3d. above. This, on the basis of last year's sales, will contribute an additional £3000, and the net surplus (obviously provided last year by the lighting and domestic consumers) will be less by £2000—thus meeting the estimated higher expenditure of £5000. Under current conditions, whatever expediency may have to say at other times, the decision appears to be perfectly fair.

Exports of Coal, Coke, and Patent Fuel.

The Board of Trade returns for May as to the exports of coal, coke, and patent fuel show a continuation in the reduction of the quantity exported, and an increase in the total value. The quantity shipped in the month was 3,664,823 tons, which was a reduction on May, 1915, of 302,834 tons, and on May, 1916, of 160,564 tons. But values indicate no inclination to recede. The value of the exports in May last was £4,909,384, or £1,366,409 more than in May, 1915, and £118,924 more than in May, 1916. When these values are compared with the quantities of coal, coke, and patent fuel that left our shores, there ought to be considerable satisfaction on the part of those who have had the business. Taking the five months ending May, the total quantity exported was 15,795,303 tons, or a reduction on the five months ending May, 1915, of 3,856,448 tons, and on the same period of 1916 of 1,205,429 tons. The value for the five months amounts to £20,963,021, or an increase on the corresponding period of 1915 of £5,546,421, and of £2,411,837 on 1916. The average value of the exports in May last was £1 6s. 9d. per ton, which is 1s. 9d. per ton more than in May, 1916.

The Nitrate Half Year.

It is recognized by Messrs. W. Montgomery & Co., Ltd., in their half-yearly nitrate of soda report, that at the present moment the compilation of statistics of real value is a very difficult, if not impossible, task. Prices free on board in Chili have shown a variation during the six months amounting to about 25s. per ton. Early in June, the price was 9s. per quintal for 95 p.ct., immediate shipment. But towards the middle of the month the market improved; and at the close prompt ordinary was quoted at 9s. 7d. It is, however, doubted by the firm whether, in view of the enormous stock on the coast, there is any justification for the advance which has just taken place. At the moment, exports are on a very reduced scale, indicating that the scarcity of tonnage is becoming more acutely felt as time goes on; and under these conditions, they find it difficult to see how prices f.o.b. Chili can be maintained. Stocks in Chili amount to 920,000 tons, which is regarded as fairly heavy, considering that production has rather a tendency to increase than to decrease. Looking at the future, Messrs. Montgomery remark that it is a long cry to next season; and for those who have no further use for the article until then, a waiting policy is suggested. While admitting that many things might happen between now and next season, they doubt if the buyer will have to pay more, if the article is available at all. Meantime, as is truly said in the report, buyers will doubtless be filling some of their requirements of nitrogen from sulphate of ammonia, under the new regulations

of the Board of Agriculture. In addition to sulphate of ammonia, too, Messrs. Montgomery see in synthetic nitrate a possibly formidable competitor with the Chilian article after the war. They are of opinion that it might be well for producers and importers alike to keep this subject ever in view; for, "owing to war necessities, developments in science are rapid, and that which might take twenty years to accomplish in peace times may be brought about in one or two during war."

PERSONAL.

A further member of the French gas industry to receive the distinction of membership of the Legion of Honour for his military services is M. Raymond Casaubon, the Manager of the Brussels works of St. Josse-ten-Norde. M. Casaubon was captain of artillery attached to the staff of one of the French armies.

At the annual general meeting of the Société Technique du Gaz en France, recently held in Paris, honorary membership of the Society was conferred upon the Rt. Hon. Lord Moulton, K.C.B., F.R.S., the President of the Institution of Gas Engineers for 1917, and on Sig. Enrico Sospisio, the President of the Italian Association of the Gas and Water Industry.

We are pleased to learn from a reliable source that Mr. Harold W. Gandon, who is in the service of the Imperial Continental Gas Association at Buda Pest, is carrying on business as usual for his Company, and, so far as can be made out, is meeting with very good success. We are also assured that Mr. Gandon and his wife are in the best of health, and although suffering from the natural privations caused by the war, are still cheerful, and are treated with consideration and respect by the Bohemian people. Their only trouble is home sickness.

Mr. T. Brown, the Manager of the Matlock and District Gas Company, has received official information that his second son, Lieutenant J. W. Brown, of the R.F.C., is lying at Dar-es-Salaam (Africa), dangerously ill with concussion of the brain. The cause of the illness is not stated; but it is assumed that he met with an accident or was shot down while piloting an aeroplane. The unfortunate officer, who is 31 years of age, was Manager of the Barbados Gas-Works (and formerly of Port Elizabeth) before joining the Colours. Prior to going abroad, he was Manager of the Chapel-en-le-Frith and Whaley Gas-Works. His younger brother, Lieutenant R. O. Brown, of the Sherwood Foresters, is in a Newcastle hospital, suffering from septic poisoning.

OBITUARY.

Mr. Robert Burr, who was wounded at the Western Front on the 18th ult., and died the same evening, was a student member of the Institution of Gas Engineers. He served as an articled pupil to Mr. J. C. Belton at the Chester Gas-Works, and at the time of joining-up was Assistant to Mr. Belton. In December, 1916, he joined the army, and after a short training was sent to France, where he served with the Chemical Section of the Royal Engineers. He was the younger son of the late Mr. B. Shaw Burr, tar distiller, of Thorne, and was 23 years of age.

A leading personality in the French gas industry has passed away with the death, at Lyons, on May 31, of M. Maurice Piaton, who, as Director of several gas and other companies, had taken a prominent part in both technical and business affairs during the past twenty-five years. He was President of the Société Technique in 1901 and 1902; and at the Toulon Congress in 1903 he afforded his colleagues the opportunity of inspecting the first installation in France for mechanical stoking. One of the founders of the French Professional Gas Syndicat, he was its President for several years following 1909. The weekly holiday for employees, of which he was a supporter, was instituted during his term of office; and his influence and sympathy were applied in other ways in establishing co-operation between employers and employed. His death at the comparatively early age of 63 was the occasion of the payment of the warmest tributes to his technical knowledge and personal attributes by representatives of the institutions to which he had unsparingly given his services.

Royal Society of Arts.—In the report of the Council which was submitted at the recent annual meeting of the Society, it was remarked that nearly all the papers read or addresses delivered at the meetings during the past session dealt with subjects connected with the war. There were, among these, the address of Mr. Dugald Clerk, D.Sc. (the Chairman of Council), on the "Stability of Great Britain;" the paper by Mr. C. M. Whittaker, on the "British Coal-Tar Colour Industry;" that by Dr. J. A. Voelcker, on "Agricultural Fertilizers;" Mr. Dugald Clerk's "History of the Internal Combustion Engine;" while Mr. H. M. Thornton, "who two years ago gave the Society a valuable paper on the uses of coal gas for industrial purposes, supplemented his former contribution by one showing specially to what a large extent coal gas was used as a fuel in the production of munitions."

CITY AND GUILDS EXAMINATION PASSES.

It was to have been anticipated, with so many of the younger members of the industry away on active service, that the request made in last week's "Journal" [p. 617] to the secretaries and managers of gas undertakings, teachers, and pupils to send on the names of those who passed in the recent gas examinations would not result in a very long list being received. There must, however, be many more successful candidates than those mentioned below; and we shall be glad to have their names for publication.

Gas Engineering.

Final Grade—First Class.

John Bradbury.
W. M. Gabbatt, Barrow-in-Furness.
Raymond Prince, Tipton.
W. Howard Wise, Tipton.

Grade I.—First Class.

C. J. Hibbard.
J. Francis Lloyd, Wrexham.
Percy J. Phillips, Cleethorpes.
Albert Wydooghe, Preston [a Belgian, 17½ years old].

Grade I.—Second Class.

Herbert Banyard, Saffron Walden.

Gas Supply.

Final Grade—First Class.

John Bradbury.
Raymond Prince, Tipton.
G. Ford, Peckham, S.E.
R. D. Holgate, Dulwich, S.E.

Grade I.—First Class.

Herbert Banyard, Saffron Walden.

WOUNDED GAS MEN IN FRANCE.

Particulars and Location Wanted.

From Mr. Walter T. Dunn, the Secretary of the Institution of Gas Engineers, we have received copies of letters which have passed between the President of the Société Technique de l'Industrie du Gaz en France (M. Rouland) and the President of the Institution (the Right Hon. Lord Moulton), with reference to British wounded who may be in the hospitals of Paris and the French Provinces. His Lordship desires us to say that he will be very glad if the relatives or friends of any officers or men belonging not only to the Institution, but who are in any way connected with the British gas industry, will send their names and particulars to Mr. Dunn, in order that effect may be given to the sympathetic wishes of the French Gas Society.

Société Technique de l'Industrie du Gaz en France,
12, Rue de Clichy, Paris, June, 1917.

The Rt. Hon. Lord Moulton,
President of the Institution of Gas Engineers.

Monsieur le President et Cher Collègue,—Having before me the formidable struggles which the valiant British Army is so tenaciously conducting on the Northern Front, my thoughts have turned to the many soldiers and officers that the gas industry of your dear country has furnished to the divisions of Marshal Sir Douglas Haig.

I therefore proposed to my Committee, and it was unanimously agreed, that our French colleagues should visit those members of your Society who may happen to be wounded and under treatment, either in the Hospitals of Paris or in those of the Provinces. I am certain that the members of the Société Technique will place themselves, so far as it may be possible for them to do so, at the disposal of your wounded compatriots in France.

If you will be so kind as to send us a list of such wounded members of the Gas Institution, indicating in which hospitals they are actually lying, we will make it a pleasure and a duty to take care of each one of them in the way of providing means of alleviating and helping them whenever possible.

Le President.
(Signed) Rouland.

Lord Moulton replied as follows:

39, *Victoria Street, S.W.* 1, *June* 26, 1917.

Monsieur le President et Cher Collègue,—I duly received your gracious letter, and immediately communicated the contents of same to the Committee of the Institution of Gas Engineers.

These gentlemen have desired me to say how deeply they have been touched by the most sympathetic thought of their colleagues of the Société Technique de l'Industrie du Gaz en France. The desire of the latter to relieve and act as friends whenever possible to any members of our Institution who may be wounded and under treatment in French hospitals can only serve to tighten not only the very real bond of sympathy which exists between your Society and ours, but also the bond existing between our two great countries, who are now fighting side by side in the great war of civilization.

I have asked our devoted Secretary, Mr. Dunn, to take the necessary steps to procure the information so kindly asked for by you; and he has at once taken the matter in hand.

(Signed) Moulton, President.

No. 1 GASHOLDER AFTER THE EXPLOSION.

WRECKED GASHOLDERS AT DUKINFIELD.

We are now able to supplement the excellent series of photographs of the wrecked gasholders at Ashton-under-Lyne which appeared on pp. 620-21 of last week's "Journal" by an equally interesting set of pictures of No. 1 gasholder and the engine-house at the Dukinfield Gas-Works, the damage to which was caused by the same explosion. For these we are indebted to Mr. William Lindley, the Engineer and Manager of the Dukinfield Gas-Works. The two holders at Dukinfield became affected ten minutes after the explosion took place at the chemical works. Both the holders were burst and put out of action; the one illustrated being reduced to practically a scrap heap. The other was punctured on the side and on the top. The roofs of the retort-house, coal-breaker house, smithy, and governor-house were severely damaged by the flying pieces of girders and machinery, as also were the walls of the governor-house and the gas-engine room. The oxide sheds were particularly badly damaged.

ANOTHER VIEW OF No. 1 GASHOLDER.

CORNER OF ENGINE-HOUSE AFTER THE EXPLOSION.

A THIRD VIEW OF THE No. 1 GASHOLDER AT DUKINFIELD.

COAL GAS FOR VEHICLES.

A Suggestion and an Example.

THERE was a somewhat curious coincidence in connection with two letters, both bearing the same date, which reached the "JOURNAL" office on Saturday morning. One of these was from a correspondent who, enclosing a cutting from a local paper on the subject of coal gas for light vans, said it had occurred to him that, as many gas undertakings have discontinued using their motor vehicles on account of petrol difficulties, it would be a good thing if some of them could be induced to use gas for motive power, and so put their vans on the road again, and advertise the new idea at the same time.

The second letter was from Mr. Norman S. Cox, the Secretary of the Sunderland Gas Company, who sent a photograph and a few particulars of a van which is being driven on coal gas, owing to the shortage of petrol, in connection with the clearing of his Company's prepayment meters—thus exactly meeting the suggestion of the other correspondent.

The vehicle is 20 a H.P. "Studebaker" delivery van, with a flexible gasholder on top, 10 ft. long by 6 ft. diameter, and having a capacity of 190 c.ft. With the holder fully inflated, the van will travel ten miles; and as no journey exceeds this distance, there is no difficulty in regard to charging, which is done (the time occupied being fourteen minutes) at the distribution department, where the car is kept, and from which point the slot-meter collectors work. The cost of conversion was £14; and the driver can switch-over to petrol again without difficulty, in case of necessity. The new arrangement has been a fortnight in operation, and has worked very satisfactorily.

Mr. Cox submits the following figures in the matter of working cost: 250 c.ft. of coal gas equals 1 gallon of petrol; and with gas at 1s. per 1000 c.ft. (which is the Company's lowest selling price), this is equivalent to petrol at 3d. per gallon. The contract price of petrol, however, being 2s. 1d. per gallon (2s. 4d., less tax returnable, 3d.), the saving per month, reckoning 50 gallons would be required, is £4 11s. 8d.

"Studebaker" Slot-Meter Collectors' Van, Driven on Coal Gas.

Yorkshire motor vehicle contracting concerns have observed the growing success of the new gas-driven cars in various parts of the country, under the restrictions and high cost of petrol. Harrogate has recently adopted it for buses, and now Halifax and Todmorden—two towns where the motor bus has been found more serviceable than tramcars on the hilly routes—have decided to give the new method of traction a trial.

Australia and the Manufacture of Benzene and Toluene.—The Department of Commercial Intelligence are, says the "Board of Trade Journal," in receipt of information from the High Commissioner in London for the Commonwealth of Australia, to the effect that the Defence Department of the Australian Government propose to erect plant for the production of benzene and toluene in the Commonwealth. The crude benzol to be treated will be obtained from the various Australian gas companies.

Protecting Gasholder Tanks from Ice.

Replying to a question in the American "Gas Institute News," with regard to a relief holder that was wrecked by the formation of ice at the bottom of the tank, Mr. R. A. Wallace, of Quebec, explains the method adopted by him for preventing trouble of this kind. In arranging the steam pipes and jets to our gasholder tanks, he says, we have found it necessary to distribute the outlets of the steam-jets at different levels, as well as round the circumference, to maintain the water in constant motion around the full surface of the sides of the tanks, while at the same time imparting heat from the steam. When this was not done, we noticed a tendency to formation of ice at the lower part of the tank-guides, and at the angle formed by the sides and bottom. For example, in the tank of our relief holder, which is 62 ft. in diameter and 20 ft. deep, we use six steam-ejectors, of a pattern resembling the old-fashioned gas-stove air mixers—a bulb-shaped casting with several holes drilled near its base where the steam-jet enters; the other end being tapped large enough to receive a larger pipe to form the mixing-chamber. The steam nozzle is carried about $\frac{3}{4}$-in. past the holes referred to; the supply-pipe being $\frac{1}{2}$-in. and the nozzle tapered to a $\frac{3}{16}$-in. jet. The mixing-chamber is of 1-in. pipe. The ejectors are located about 6 in. or less below the surface of the water. Two of the mixing-pipes are carried to within 2 ft. of the bottom, and two are made to terminate about halfway down; these four being in a vertical position, with elbows at their lower ends. The other two are placed horizontally, just below the surface; care being taken that all the outlets face in the same direction round the tank, so as to maintain a circular movement of the water.

ELECTRICITY SUPPLY MEMORANDA.

In our editorial columns last week, there appeared a criticism of some of the points in a paper read by Mr. J. A. Robertson at the annual meeting of the Incorporated Municipal Electrical Association, in which he discussed the ways and means by which the electricity industry could aid in the fuel economy campaign. The "Electrical Review" described the paper as an "able" one; it did not strike us quite in the same light—probably because we did not examine the production from the same point of view. It is to be hoped that Mr. F. M. Long, the Electrical Engineer of Norwich, will not consider it a slight to his Presidential Address that precedence should have been given by us to a notice of a paper; the only reason for so doing being that the paper reached us before the address. The address was truly modest—in length and tone; but it was full of hope as to electrical development, and splashed here and there with evidence that Mr. Long is a believer in charity beginning at home. He claims special consideration and privileges for the electricity industry; while other industries—such as that trading primarily in gas and secondarily in other commodities—must look after themselves. Why special consideration and privileges, when Mr. Long is able to point to several thrusts outwards into fresh uses of electrical energy? He says the year marks the beginning of a new era in the work on which the electrical industry is engaged; for in it there have been taken the earliest steps towards the realization of that larger development of the use of electricity in the service of the country, with the possibility of which electrical engineers have for long years been familiar. To some extent British electrical engineers have been cajoled into thinking that certain of the commodities produced by water-power-derived electrical energy altogether put out of competition any similar commodities derived by the aid of their coal-produced electrical energy. But they have latterly been learning more and more as to the capital costs of water-power generating plant and of the freights for bringing the commodities from water-power blessed countries, which items somewhat alter the balance of advantage. The electric steel furnace has come. There are 27 of these now in Sheffield, ranging from 260 kw. to 3000 kw. Manufactories are being constructed in this country for the production of nitric acid and fertilizers from atmospheric nitrogen. There are also factories for making phosphorus and arcorundum—an abrasive material very similar to carborundum. All such new industrial developments which reduce imports are valuable; and, where they do not injure well-established home industries, they must be of great advantage to industries generally, either on account of direct patronage or the increased spending power which industrial developments help to promote. It is appreciated by Mr. Long that the development of manufactures in which other industries may be concerned—such as the chemical and dye industries to the maintenance of which the gas industry materially contributes—also helps to create other fields for the supply of electrical energy. Beyond, there is the research into the use of electrical energy for vivifying the growth of the earth's produce; and there is the use of energy on railways, canals, and for charging electric vehicles. The electrical industry is clearly looking on the future through rose-tinted glasses.

Diversity of New Business.

Lines of Development and a Control Board.

There are those enthusiasts who dream that many of these developments are coming to pass as if by magic. Mr. Long is not one of them. Large centralized power stations and expensive systems of wires carrying current up and down and across the country and above countless miles of hedgerows to the cities and towns and the small rural settlements, are not, in his opinion, coming into existence other than, if at all, by systematic growth and with time. The hypothetical balance-sheet has not yet been prepared which even suggests a gain in financial economy from such a course—capital expenditure and all included. It is all mainly mere guesswork. Mr. Long believes in being sane in such matters, and in going to work methodically—in starting with the present stations, and radiating out to pastures new, because it must necessarily be many years before it is possible to run bulk supply mains from stations in the coal-fields to supply such areas as (say) the eastern and the southern counties. The responsible engineer of each undertaking should therefore now consider the problem of expansion, and prepare a scheme to which effect could be given after the war. But uniformity ought to be a *sine quâ non*, with the view of possible eventual linking-up, or bulk supply. In other words, there should be a standardization of methods of distribution and appliances. Further, whatever schemes are adopted, they should be such that the existing undertakings do not suffer loss, but would share in the benefits of the lower costs of production which should result. But a fundamental necessity is the reorganization of Government control of the industry, together with the granting of additional powers. The Council of the Association feel that the control of municipal undertakings by three distinct departments of the Government—the Board of Trade, the Local Government Board, and the Home Office—is not at all satisfactory, and that the powers exercised by these departments under the Electric Lighting Acts should be conferred upon one specially constituted Department or Board. We cannot discern any reason why the electric supply industry should have preferential consideration in this way. If for the electricity industry, why not for the gas industry? It is an equally deserving and long-suffering statutorily controlled institution. The Board which would comply with Mr. Long's desires is one which should be free from political influence, should have full powers, should include engineers of extended experience of electricity undertakings, and the members should devote their whole time and interest to the business. The powers of action should be such as would enable the Board to deal without reference to any higher authority with all matters concerning electricity undertakings—excluding only the owning and operating of them. This is a very nice arrangement indeed. But again we ask, where is the possible justification for this special treatment for the electricity industry? With such a controlling body, we quite agree there would be some hope that "powers urgently required for the industry would soon be obtained." There is no question that procedure would be simplified, that matters would be more expeditiously dealt with, and that much of the present expense would be avoided. There is, however, a difficulty of a legislative and judicial order. A special body of the kind well weighted with an electrical element would look with religious fervour after the interests of electricity supply; other interests might go to the dogs. We have not the slightest fear that an *ad hoc* controlling authority for the gas industry would have the same tendency to rather neglect the interests of other industries in looking after those of its own *protégé*. This might not be to the common good.

Suggested Legislation as to Powers of Charge.

In framing the general procedure governing the powers of charge in the case of gas and electricity, too, Parliament has endeavoured to give a certain amount of elasticity to the suppliers, while at the same time protecting the consumers and other interests against unfairness. But the Municipal Electrical Association, abetted by the Association of Electrical Power Companies, propose to try to persuade Parliament that they are wrong, and that there ought to be still more liberty to a concern that can now charge for its commodity the fraction of a penny for one purpose and several pence for another purpose. The proposal has been incorporated in the Association's Electricity Supply Bill, which seems to be its hoary and ill-fated production in amended form. The measure now includes—besides the old wiring and hiring powers, preferential capital sanction, and many other things, some of which form a departure from the common rule—powers as to wayleaves, lines above ground, joint working, and methods of charging. The gas industry is especially interested in the last-named matter, seeing that it is only allowed to give discounts not exceeding a clearly-fixed maximum, "provided that all discounts shall be of equal amount under like circumstances to all consumers;" or, alternatively, provided that every contract "entered into shall be alike in terms and amount under like circumstances to all consumers." These enactments have the same effect as the preferential charges one which the electricity industry finds so irksome in its bargainings with people to obtain a transfer of custom from the gas industry. It wants to loosen its hands, and to keep the hands of the gas industry tied. Its notions of fair fighting are somewhat crude. Mr. Long says it has been found "necessary, in order to extend the use of electricity, to differentiate between charges for supplies of light, power, heat, &c., as well as to devise special methods of charging, the validity of which can only be settled in a Court of Law." In other words, the electricity industry cannot compete for power or heating supply unless they charge ridiculously low prices compared with the rates for lighting. This shows the limitations of electricity supply. The present position, according to Mr. Long, is not satisfactory; and what the Bill proposes is that power should be given to the Board of Trade to approve methods of charging whether for energy, stand-by supplies, or other services rendered. "Such methods would then have legal authority, and opportunities for vexatious litigation would be removed." In the cases that have so far been decided by the Courts, it has been seen that the opportunities for litigation were supplied by electrical undertakings breaking the law. However, it is feared that nothing can be done by the Association in pushing forward the Bill while the Board of Trade Committee is considering the question of electrical development, and what course of action is necessary thereto. A copy of the Bill has presumably been handed to the Departmental Committee. It is hoped they will be edified; and that, if they adopt the proposals, they will explain why the electricity industry deserves preferential legislation as against the gas industry. Should the Government create a special Board or Department for Electricity Supply, Mr. Long thinks the obvious course would be for it to take over the Association's bantling. The real importance of the measure is demonstrated by the fact that the industry gets on very well year after year without the preferential powers that are now sought for.

The Agitation and the Result.

The electricity industry is still seething with resentment over the action of the Board of Trade in connection with not only the constitution of the Committee on Electrical Power Supply, but because it prefers to conceal

certain reports already made by two other Committees—the Electrical Trades Committee Coal Conservation, and the Sub-Committee of the Reconstruction Committee. The number of local authorities who have protested against the constitution of the Departmental Committee has recently risen; and the power of resistance of the Board of Trade has given way under the strain, with the result that three additional members representing municipal interests are to be appointed. The announcement of this concession having deprived the agitators of their temporary "bone of contention," they have picked up another. "What about the representation of the electrical companies?" And we suppose this will be drummed into the ears of the Board of Trade until there will be a further reinforcement of the Committee. Meanwhile, the Chairman of the Committee (Mr. Huth Jackson) has resigned under medical advice. Of course, with the revision of its membership, the Committee cannot until there is final settlement get to solid work. The concealment of the two reports the publication of which is so anxiously wished for by the Electrical Press is a matter over which it is just possible that the Board of Trade are taking the correct course. Their circulation would only open the floodgates of discussion before the Departmental Committee have considered them and have—after so doing and hearing evidence and using their own brains—issued their own report. But someone has unkindly supplied the "Chronicle," "Daily News," and "Star" with information as to the main line of the contents of the report of the Sub-Committee of the Reconstruction Committee; and the result is confusion. It seems that the Sub-Committee favours the division of the country into areas—one account says sixteen, another seven—and that for each of the areas consideration should be given to the question of the reorganization and co-ordination of generation and supply. If this idea is the one which will be adopted by the Departmental Committee, the schemes might be matured during the passing of the next few generations of electricity consumers, and when the members of the present Departmental Committee are not here to care much about what happens. Where there are undertakings established, and heavy capital already involved, there cannot be reorganization and co-ordination in a brief space of time. But that the Government Departments are not of opinion that any immediate revolution is going to take place is seen by the fact that, despite Treasury restrictions, some goodly slices of loan sanction are being handed out where war necessity compels; and that municipal bodies do not contemplate any immediate interference with their independent action is clearly to be perceived by the many schemes of plant extension which are in course of preparation.

Overheating of Cables and Gas Generation.

There have been lately numerous small underground explosions causing some inconvenience to neighbouring users of electricity, as well as disturbing free locomotion on pathways. The capacity of electric cables for acting as gas generators by overheating, and eventually causing an explosion without any external aid, has been proved by some disastrous occurrences. It is a serious subject for the electricity industry; but the "comic man" of the "Electrician" finds it suitable for one of his pallid jokes. Alluding to the fact that, according to a press report, following several loud explosions, about 100 ft. of pavement became displaced through the fusing of an electric cable igniting a quantity of gas which had accumulated under the footway, he says: "This, of course, is the perfectly proper method of showing that vigorous co-operation between gas and electric interests is now taking place." From another part of the same issue of our contemporary it is learned that a circular-letter has been sent out by the Incorporated Municipal Electrical Association, covering a communication from the Secretary of the Institution of Electrical Engineers. This refers to proposed research into the heating of underground electric cables—pointing out that the results will serve as a guide to every electrical undertaking in future in deciding the limits to which underground cables can with safety be loaded, and suggesting that each municipal electric supply undertaking should subscribe a sum of from a guinea to five guineas, according to the size of the undertaking, towards the current expenditure. The subject is also at the present time being brought before the American Institute of Electrical Engineers by Mr. J. L. Harper. In analyzing the causes of cable failure, he draws the conclusion that overheating is the most important for consideration. He suggests that the dissipation of heat by water be applied to new and permanent construction, and that, in places where such construction is possible, conduit systems should be built so that the ducts can be flooded with water, and cables operated under practically submarine conditions. Bare copper wires in aerial transmission lines now carry approximately twice the current that is carried in the corresponding conductor of an underground paper-insulated cable; and, if the lead sheath of the cables were kept at a temperature below 60° C., by the presence of water, the carrying capacities of underground cables could be made nearly to approach that of bare aerial conductors. The rapid and definite dissipation of the heat from the cables with water immediately surrounding them would not only greatly increase the carrying capacity of any particular cable, or of a particular conduit system, but would decrease possibilities of cable trouble from all other causes except mechanical injuries of the lead sheath. This is Mr. Harper's view. No doubt it will receive all due consideration by the investigators in this country.

AMERICAN GAS INSTITUTE "TRANSACTIONS."

Two substantial volumes are filled by the official report, edited by the Publication Committee, of the proceedings of the American Gas Institute at the eleventh annual meeting, which was held in Chicago last October. The first of the volumes has for a frontispiece an excellent portrait of the past year's President, Mr. William F. M'Kay, of Boston—who is now succeeded in the chair by Mr. Alfred E. Forstall, of New York. The work of Secretary and Treasurer, it is noted, remains in the capable hands of Mr. George G. Ramsdell, of New York.

As is stated on another page of this issue, vital national affairs have determined the Institute to postpone indefinitely the holding of the next regular annual meeting, which had been fixed for next October, at Washington; and this probably means the suspension of much of the normal work until the conclusion of the war. At the same time, it was at once recognized that new situations create fresh needs; and arrangements were promply made for a meeting last month for the discussion of the conditions and problems arising from the state of war. Pressing Committee work is also to be continued. It is, however, with a normal year's work we are just now concerned; and for this it must be admitted that the 1400 pages of print and illustrations (with the addition of a number of plates), of which the two volumes consist, make a very good showing indeed. Of the papers and reports themselves, it is unnecessary—seeing that they were noticed in the "JOURNAL" as soon as possible after the meeting—to say anything more than that they deal with many matters appealing to the manufacturing and the selling sides of the industry.

SCIENCE AND INDUSTRY.

Research in the United States.

PRIMARILY to record the author's observations during a recent visit to the United States, and secondly to afford material for the consideration of the position of the United Kingdom in respect of research, there has been published the first of a series of pamphlets which the Advisory Council for Scientific and Industrial Research intend issuing. It is by Mr. A. P. M. Fleming, on "Industrial Research in the United States," and is published by H.M. Stationery Office, at the price of 1s. net, or 1s. 3d. post free.

A glance through the profusely illustrated pages of this booklet convinces one that the author has done his work thoroughly; and the trend of development in the United States should have a bearing on our own national problem. The industrial research laboratories described are classified under manufacturing corporations, associations of manufacturers, universities and colleges, national institutions, commercial laboratories, and scientific societies. As to the first class, it is shown that the most striking features of the research work undertaken by companies are: (1) The installation in many cases of full-scale manufacturing facilities, which, on the one hand, enable processes to be perfected and the works to be relieved of the hampering effects of experimental developments; and, on the other hand, give the laboratory staff some elementary practical introduction to the complexities of actual manufacture, as contrasted with the relative simplicity of laboratory preparation. (2) The provision of manufacturing facilities in the laboratory, in order to develop such products as result from new discoveries to the point at which the scale of manufacture calls for transfer to one of the works departments, or to a new and separate organization. (3) The growing tendency to devote more of the resources of the laboratories to pure science investigations, with a view to making discoveries.

The freedom with which results in pure science are published is commented upon, as well as the growing appreciation in the factory of the commercial value of scientific men, and the recognition of the usefulness of research laboratories as a means of inspiring confidence in the minds of customers. It is noted that there are a number of associations of manufacturers who undertake research work for the benefit of their members—in laboratories connected with individual manufacturers, in universities, or at the Bureau of Standards.

Emphasis is laid on the value of the results of organized research as a factor in the struggle for world markets; and it is urged that the research facilities are in this country as yet disproportionate to the need—there being an urgent call for the establishment of an organization which shall maintain the creative impulse given by the war. Coming to the practical application of the lessons contained in the booklet, the author suggests that the most important alternative schemes for the United Kingdom are: Research laboratories in industrial works; research laboratories for a group of works in the same industry; centralization of research in the universities or colleges; and an Imperial centralized laboratory for the whole of industry.

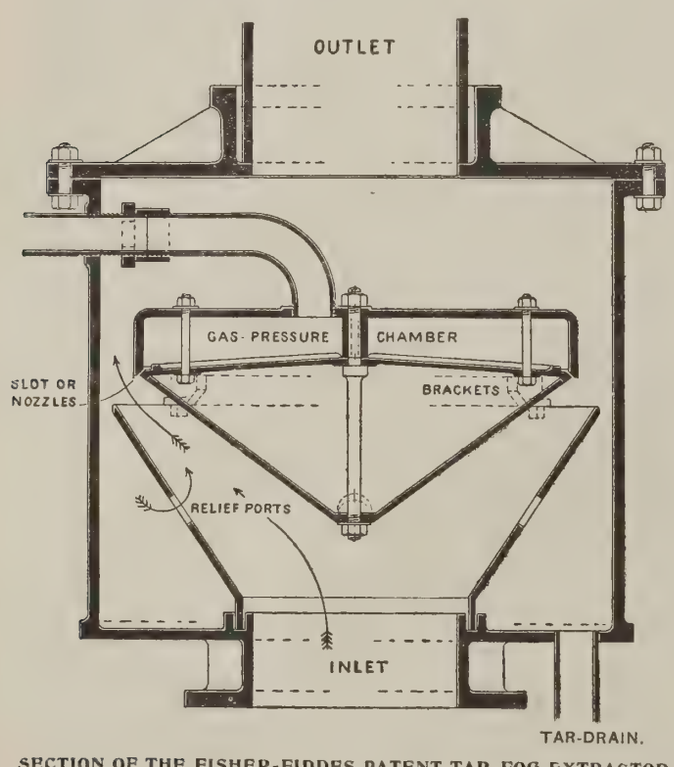
Gas from Wood, Peat, and Lignite.—In publishing in our issue of June 19 last (p. 578) a translation of the papers on this subject read before the one-day congress of the Société Technique du Gaz, we were unable to state the name of the author—the advance proofs sent from Paris not making mention of the origin of the communication. We learn that the author was M. Laurain, of the chemical staff of the Paris Gas Company.

THE ELIMINATION OF TAR FOG.

The Fisher-Fiddes Patent Extractor.

The removal of tar fog from coal gas as soon as possible after it has left the hydraulic main has for a long time been considered desirable, both on account of preventing the absorption of the hydrocarbon constituents of the gas, and also as a starting-point for various methods of overcoming naphthalene troubles. Up to the present it has been very difficult to effectively remove this tar fog before condensation, as the temperature is usually too high for the Livesey type of washer, and those of the P. & A. type quickly block-up and become inefficient. In small works tar removal has frequently been done in a haphazard way, which is very unsatisfactory, particularly where oil-washing is being installed.

Mr. Randall, of the Yorktown and Blackwater Gas Company, at the last meeting of the Eastern Counties' Gas Association, mentioned a simple apparatus devised by Mr. Fisher and Mr. Fiddes, of Tottenham; and we now have pleasure in publishing a diagram and description of what they hope to make the standard design. The apparatus was originally designed—but in a different form—for the removal of dust from the producer gas required for heating the vertical retorts of the new section at Tottenham, of which we recently published a description; but, with slight modification, it has been found very effective for the removal of tar fog both from coal gas and carburetted water gas. The idea is to pass the main stream of gas through a rapidly moving jet or film of clean gas, or through more than one set of jets or films if necessary, whereby in the case of dust the particles are deflected sufficiently to enter an aperture leading into a dust chamber, or, in the case of tar, are made to impinge at a suitable angle against a plate from which it collects in a tar-receiving chamber. The gas used for the clearing passes with the particles of dust or fog into the chamber, and returns to the main stream through relief ports which may be fitted with valves.



SECTION OF THE FISHER-FIDDES PATENT TAR-FOG EXTRACTOR.

The illustration shows the apparatus in circular vertical form. The gas enters at the bottom, and passes up a cone-shaped pipe so as to reduce its velocity as much as possible. At the top, it meets a film of gas issuing at high velocity from a narrow slot round the circumference of a pressure chamber. The tar particles are deflected against the side of the main vessel at an angle of about 45°; and the tar quickly forms a film which still better arrests further particles. The tar trickles down to the bottom, and passes away through the tar-drain to a seal-pot, while the clean gas flows forward to the outlet at the top or side as may be convenient. The best position for the apparatus is before the exhausters, as the main stream of gas is then at a diminished pressure, while a connection from the outlet of the exhauster to the pressure chamber will, in nearly all instances, provide ample pressure for the cross current to do its work effectively.

At Blackwater, Mr. Randall finds one of these machines—made up in very homely fashion—very effective for dealing with coal gas. At Tottenham, two P. & A. machines, each for two million cubic feet per diem, have been altered to an arragement similar to that illustrated, and are removing much more tar and condensation from the gas than was the case when they worked as P. & A. machines with double belts and with a pressure difference of 4½ inches.

For these fair-size machines, with 20-inch connections, a 3-inch pressure-pipe is found sufficient. The inlet pressure to the exhausters is about 3 in., and the outlet pressure about 20 in.; but this is reduced in the pressure chamber to about 12 in. There is no back-pressure thrown by the apparatus.

The following results have been obtained on test; the variations being due almost entirely to some irregularity in condensation on account of varying make and atmospheric temperature.

Test.	Gas Passed. Cubic Feet.	Extracted. Gallons.	Extracted per Million C.Ft.
A. ..	186,000 ..	7 ..	35·0 gallons
B. ..	750,000 ..	22 ..	29 0 ,,
C. ..	5,000,000 ..	191 ..	38 0 ,,
D. ..	3,500,000 ..	72 ..	20 6 ,,
E. ..	5,500,000 ..	249 ..	45·0 ,,
		Average ..	33·5 gallons.

The result attained by the P. & A. machines under similar conditions was:

	Gas Passed. Cubic Feet.	Extracted. Gallons.	Extracted per Million C.Ft.
Original extractors ..	2,590,000 ..	12½ ..	4·8 gallons.
The F.-F. extractor ..	4,775,000 ..	92 ..	19·3 ,,

AMERICAN TECHNICAL MEETINGS POSTPONED.

The altered conditions brought about by the entrance of the United States into the war have led to the postponement of several important meetings of gas men.

In the first place, it has been decided that it is inadvisable to hold the regular annual meeting of the American Gas Institute, which was to have been held during October at Washington. In order, however, to afford the earliest practicable opportunity for discussion of the conditions and problems affecting the gas industry arising from the state of war, it was resolved that a special meeting of the Institute should be held in New York on June 12, and possibly the following day. When the Board of Directors decided on the postponement of the general meeting, they requested the Technical Committee to have completed as soon as possible all papers and reports on topics of vital interest in the present war emergency, for publication in the "Gas Institute News;" these papers and reports to be considered as preliminary, and final ones to be submitted at the postponed annual meeting. Meeting subsequently, the Technical Committee determined that, in accordance with this request, work should be expedited on the following reports, &c.: Report of Committee on Standard Tests; report of Committee on Carbonization; report of Committee on House Heating; report of Committee on Gas-Fuel Appliances; report of Committee on Distribution Standards; report of Committee on Chemical Tests; all papers in the Chemical Section; a paper on "Coal Carbonization;" and a paper on "Coal Production and Removal of Naphthalene." With reference to the report of the Committee on Refractory Materials, it was resolved—"That the Refractory Materials Committee be requested to apply their efforts towards a report which will be of assistance, in view of the increasing shortage of refractory materials heretofore commonly used, by suggesting some of the new materials now being manufactured and the sources thereof, and describing their qualities." Work on all other papers and reports is to be continued, for presentation at the postponed meeting of the Institute.

For the same reason, the National Commercial Gas Association of America have postponed until a time to be later determined the annual convention which was to have taken place at Detroit during next November.

In line with others, the Iowa District Gas Association indefinitely postponed the convention called for last May.

Anunal General Meeting of the German Association of Gas and Water Engineers.

The programme of the fifty-eighth general meeting of this Association, which was to have been held on June 22 at the Institution of German Engineers in Berlin, included the following items: Inaugural Address of the President, Herr M. Hase, the Manager of the Gas, Electricity, and Water Works of Lubeck; and a communication by him on the "Position of Gas and Water Works in War Time." A general discussion of this communication was to take place, in which, for convenience, the ground covered was to be divided into five sections, taken in order as follows: (1) Coal supply, the effect of the coal-tax on the position of the gas industry, and coal storage; (2) the handling of bye-products; (3) heating questions; (4) general gas-works topics, electro-motors free from danger of causing explosions; and (5) general water-works topics. The meeting also was to receive the annual report of the Council, the accounts for the year, and the reports of the Technical Committees appointed by the Association. The proceedings were to be restricted to one day, and every kind of festivity was to be omitted. This year's Vice-Presidents of the Association are Herr R. Terhaerst, the Manager of the Nuremberg Corporation Gas-Works, and Herr E. Körting, General Manager of the "Gas Company, Berlin." Prof. Dr. H. Bunte is again acting as General Secretary of the Association, in place of his son, Dr. K. Bunte, who is on active service.

A BOILING-RING WITH AUTOMATIC GAS-TAP.

[From a Dutch Correspondent.]

The heating of water by means of a kettle on a boiling-ring often entails some waste of gas; for it is a custom of the kitchen to leave a steaming kettle over the fire. To avoid any possibility of this waste, automatic means are necessary; but there is a big difference between a thermostat as used in the laboratory or in industry and an automatic arrangement suitable for kitchen purposes.

A Belgian inventor, M. Bennik, formerly of Brussels and now in Holland, has designed an apparatus, which seems to have a promising future. The boiling-ring is provided with a double burner, for two gas-taps, one for the large burner-ring and another for the smaller one. The tap for the larger one is connected with a lever running along the underside of the boiling-ring. This lever, in its turn, is connected with a vertical rod passing through an upright tube, and having on its upper end an inclined tube as shown in the illustration. In the upright tube there is a spring

acting on the vertical rod. The upper end of this rod supports an inclined tube, moving in a socket round the rigid vertical tube. Inside the inclined tube is a rod of metallic alloy of high expansive capacity, which rod is connected firmly to the lower end of the inclined tube, but acts at its other end on a small lever governing in its turn a series of pins on the vertical tube. These pins keep the spring out of action, and retain the inclined tube in its place.

The kettle is provided with a lid having a hole in the upper part, so that when it is in its position on the boiling-ring, and the inclined tube has been placed over the hole, the hot steam must pass through the tube, thus heating the expansion rod. Directly the water reaches boiling-point, and a jet of steam passes through the hole in the lid into the inclined tube, the expansion of the rod becomes extensive enough to push forward the small lever, which in its turn puts aside the movable one of the pair of stop-pins. In this way, the restraining action on the spring is removed, and the spring forces the inclined tube and vertical rod to partly revolve. This turning of the rod causes a movement of the lever connected with the burner-tap, which is thus turned off, so that the gas supply is discontinued.

The action of the steam on the expansion rod in the inclined tube in this manner causes the turning-off of the larger burner, while the smaller burner remains in action. The water is therefore kept boiling, but with a considerably lower gas consumption. The automatic arrangement comes into action almost immediately the water reaches boiling-point.

NITRIC ACID FROM COAL GAS.

Some particulars are given in the current issue of "The Times Engineering Supplement" regarding a process evolved by Prof. Häusser for the manufacture of nitric acid direct from coal or similar gases by explosion—a trial plant for which, on a fairly large scale, was known to be in operation at the Nuremberg Gas-Works before the war.

The explosion of the gas is effected in steel vessels surrounded by a water-jacket, to which, in the original plant, air and gas were admitted under pressure through separate valves. Ignition of the charge then takes place by means of a high-tension spark derived from a magneto attached to one side of the vessel. The magneto is connected with, and driven from, the same mechanism as operates the valves.

The chemical reactions involved in the process are of a particularly simple nature. The nitrogen combines with oxygen to form nitric oxide: $N_2 + O_2 = 2NO$. The nitric oxide mixtures are then cooled and passed into a gasholder, where the necessary time is allowed for oxidation to take place on the following lines: $2NO + O_2 = 2NO_2$. The nitrogen peroxide formed by oxidation is finally sent forward to counter-absorption vessels, where, reacting with water, it gives rise to the formation of a mixture of nitric and nitrous acid as follows: $2NO_2 + H_2O = HNO_3 + HNO_2$. The nitrous acid is then oxidized to nitric acid by an excess of oxygen. In this way, the acid obtained varies in strength from 30 to 50 p.ct., and the weak product is in most cases evaporated and re-distilled in order to provide a concentrated solution. The waste gases from the plant, still containing some nitric oxide, are treated in special washing towers, in order to recover the greatest possible quantity of the nitrous products. Generally from 2 to 3 p.ct. of the original nitric oxide gas is discharged with the waste products.

It is explained by our contemporary that, so far as can be ascertained, the original plant has now been considerably modified, particularly as concerns the explosion chamber; and the efficiency of the latest apparatus is such that expectations have been surpassed. In its new form, the plant consists of a battery of chambers or bombs, all of which are supplied from two compressors; while, instead of the gas and air being compressed together, the two are dealt with separately. It is essential that a high temperature should be attained during explosion; and to this end the air, after compression, is passed through a specially designed pre-heater operated by gas. For reasons of temperature, again, a small proportion of pure oxygen is regularly mixed with the air in the compressor. The latest form of container is fitted with four valves, driven by gearing from an electric motor; and it is the speed of this motor which determines the number of explosions per minute. It is essential that rapid cooling of the waste products should be effected, otherwise there is a tendency for the nitric oxide to undergo decomposition; and a special exhaust-valve is employed for the purpose of temperature drop. Immediately on the outlet of the bomb is attached a condenser coil submerged in water; and in this coil the water resulting from combustion is thrown down and drawn off. It is customary to regulate the explosions so that they occur in each bomb at the rate of about sixty per minute. Within limits, the greater the capacity of the bomb the larger will be the yield per unit of gas.

The process is applicable to producer and all low-grade gases; and so far as the yield of nitric acid is concerned, it has been shown that, when employing coke-oven gas, about 6¼ lbs. of acid per 1000 c.ft. of gas exploded must be looked upon as a maximum.

AUTOMATIC TEMPERATURE CONTROL IN DEBENZOLIZING OIL.

In a communication to the American "Gas Age," Mr. P. M'Donald Biddison insists on the importance of delicate temperature control in steam stills and condensers, as used in connection with gasoline absorption plants, and remarks that the process used for extracting gasoline from natural gas is similar to that applied for the extraction of benzol and toluol from artificial gas, with the exception that the treatment of the first is carried out under high pressures—sometimes as much as 300 lbs. per square inch—while with the second absorption takes place near atmospheric pressure. In either case, it is merely a matter of washing the gas with a suitable absorbent oil; the gas being passed upwards through vertical towers or scrubbers packed with porous material, and meeting a downward flow of oil that carries with it the heavier hydrocarbon content of the gas. The saturated oil is sent to a steam-still for the separation of the dissolved matters, and can be used again.

Two illustrations of common forms of stills and condensers are given, comprising rectangular stills surmounted by stone towers packed with porous material, and the usual arrangement for separating and returning to the still any absorbent that may be mechanically carried over. The incoming oil is admitted at the top of the tower, where the vapours also pass off; so that it acts as a dephlegmator. Waste exhaust steam is delivered to the still and distributed through perforated pipes, and if necessary is augmented with live steam. The supply of the latter is governed by a 2-in. "Sarco" thermostatic valve, in order to maintain an even temperature in the still. If the apparatus is small as compared with the required work, a high still pressure may be necessary; but if it is of sufficient size, the heat and partial vacuum effect caused by the presence of steam will drive off the light oils from the absorbent at 210° to 213° Fahr. As the end point is 290° to 300°, it is evident that the partial vacuum is important, and that the vaporization of the heaviest fractions, at a temperature considerably below their boiling-point, requires the presence of uncondensed steam.

Excess of steam means not only waste of water and fuel, but the carrying over of considerable quantities of absorbent, even if the initial boiling-point is well over 350°; and shortage of steam means incomplete abstraction, leading to diminished absorbing power, and a deficient gasoline yield. Hence the importance of accurate temperature control, which must in the first place be determined by experiment on each apparatus used. Variations of 2° either way may have a marked effect on the results, as it is evident that hand-regulation of valves is not sufficiently sensitive;

and fluctuations in the supply of exhaust steam, due to changes in the speed of machinery, cannot be corrected until after they are evident at the thermometer. A temperature of 180° to 190° in the separation pot will condense all the absorbent carried over, together with most of the steam; and excess at this point means the loss of absorbent by passing forward with the condensible portions. Lower temperature means premature condensation of gasoline, and its return to the still. The water supply for cooling the auxiliary condenser and the separating pot is controlled by a thermostat similar to that used on the still.

The fact that the saturated absorbent contains only 3 p.ct. of gasoline, illustrates the need for very close temperature regulation, and with the arrangement described uniform and constant results have obtained over six months' working.

Communications to the Coal Controller.

Mr. Thomas Glover, who is advising the Coal Controller on technical questions affecting the gas industry, asks us to state that all communications on questions of supplies, &c., should be addressed to the Controller. This may save delay in getting replies to letters, as Mr. Glover is not likely to be in attendance at the Board of Trade quite so constantly as he has been during the past eight weeks.

Presentation to Mr. F. R. Smith.

An interesting gathering took place at the Cottage Lane Works of Messrs. W. Parkinson & Co., on Friday evening last, when Mr. W. W. Parkinson, on behalf of the staff and employees, presented Mr. F. R. Smith with an engraved silver rose bowl, and a silver fitted toilet case for Mrs. Smith. In making the presentations, after referring to the long and valued service Mr. Smith had rendered to the firm, extending over a period of forty-five years, Mr. Parkinson said he was glad to state that, while relinquishing the active management at Cottage Lane, Mr. Smith was continuing his connection with the Company—retaining his seat on the Board, and rendering assistance in various ways. Mr. Green, the Shop Secretary, also spoke on behalf of the workmen, and referred to the many kindly and sympathetic actions Mr. Smith had shown during his long term of office, and of the excellent spirit that existed at Cottage Lane works between the men and the management. Mr. Smith, in cordially acknowledging the handsome presents on behalf of his wife and himself, referred also to the good name that the works had enjoyed throughout the trade; and he expressed the hope that the bond of union between employers and employed would be still further strengthened. He looked forward to the day when the conclusion of peace would bring with it the larger blessing of a mutual and permanent agreement between Capital and Labour, and so make the world a brighter and better place to live in.

Estimation of Toluene and Benzene in Coal-Tar Oils.

In the current issue of the "Journal of the Society of Chemical Industry" appears an abstract of a paper, by Mr. G. Harker, in the "Journal of the Royal Society of New South Wales." It is pointed out that in estimating toluene and benzene in coal-tar oil it is usual to subject the tar oil to a preliminary distillation to 150° or 170° C., followed by a washing of the distillate with sulphuric acid and caustic soda. The washed product is then distilled under conditions varying considerably. From the volume of the fraction collected between certain temperatures and by reference to tables, the compositon may be deduced. But the range of such tables is limited; and occasionally pure benzene, toluene, or xylene must be added before distillation. The author carried out a series of experiments with pure benzene, toluene, and xylene. A Young and Thomas still-head of five sections was used, and the rate of distillation was kept at one drop per second. When mixtures of benzene and toluene in the proportion of 3 : 1 or 4 : 1 were distilled, the volume distilling-over up to 90° C. represented the volume of benzene present. With mixtures of 50 c.c. of benzene and 50 c.c. of toluene, the first 50 c.c. came over slightly above 95° C. Additions of xylene necessitated a still higher temperature. The actual content of benzene and toluene in the samples was obtained by carrying out a blank-test of the sample after each distillation. In this blank-test, quantities of pure benzene, toluene, and xylene were added to the residue, in accordance with the approximate estimation. The mixture was again distilled, whereby any error in the first estimate was corrected. After a preliminary distillation up to 170° C., the distillate was washed with sulphuric acid and caustic soda. The washed oil was then distilled, and a blank-test carried out as described. The paraffins present were estimated by a sulphonation test with anhydrous sulphuric acid. Details of tests on three samples of coal-tar oil, sp. gr. ·928, ·98, and 1·012 respectively, were given in the original.

Sir John Ramsden has given £3000 to the Huddersfield Technical College Extension Fund, conditionally on £2000 of it being devoted to the Coal Tar Colour Chemistry Department, and the other £1000 to the Engineering Department.

"ABRUPT" CONDENSATION OF NAPHTHALENE.

Dutch Experience of the Deville Process.

The experience of Heer Grandpré Molieri, of the Gouda works, in seeking to remedy the occurrence of naphthalene deposits in works and town mains in accordance with the Paris Gas Company's system, is the subject of a recent communication to "Het Gas," translated in the current issue of the "Journal des Usines à Gaz," whence the following translation is made. Our French contemperary adds a note pointing out that the chief cause of the difficulties experienced in the first attempts at Gouda arose from the fact that the cooling installation was placed too far from the retort-bench, with the result that its action was exerted upon the gas when the latter had lost too large a proportion of its tar. It considers the success achieved by Heer Molieri very satisfactory in view of the considerable unavoidable departure from the practice which for some years past has been that of the Paris Gas Company. It will be remembered that this practice—the outcome of the researches of M. St. Claire Deville—was the subject of a paper by M. Laurain read before the 1911 Congress of the Société Technique, a translation of which passed into our pages at the time.*

Numerous obstructions due to naphthalene in both the works and town mains prompted recourse to the Deville process of "abrupt" condensation—an alternative which was adopted owing to the practical impossibility of constructing a naphthalene washer for use with heavy tar oils. A scrubber which was available in the works was converted for this purpose into a tubular "refrigerator," a Livesey tar-separator was utilized, while a small pump completed the installation. The dimensions of the different parts of the cooler used were as follows: Diameter, 1·22 m. (4 ft.); height, 9·5 m. (31 ft.); number of tubes, 88; diameter of tubes, 64 to 70 mm. (2½ to 2¾ in.); cooling surface, 165 sq. m. (1780 sq. ft.). The Livesey tar-separator had a capacity of 10,000 cb.m. (353,000 c.ft.), and consisted of a series of ten wrought-iron perforated plates, each of 1·25 m. (4 ft. diameter); the diameter of the holes being 10 mm. (0·4 in.). The maximum capacity of the small pump was 5 cb.m., about 1000 gallons, per hour.

The gas had its inlet at the top of the cooler, passed downwards through the tubes, and thence directly into the tar-separator, along with the condensed products. The water, providing the cooling action, was led into the base of the apparatus (inside the tubes) and passed out from the top. A large proportion of it could be usefully employed in the retort-houses for quenching the coke, &c.

This installation was put into use about the middle of August, 1912, and is still being used with satisfactory results. The gas enters the cooler at a temperature which, according to the time of year and volume of gas, varies from 100° Fahr. to 122° Fahr. This temperature is too low, and means require to be taken to raise it. At the outlet, the temperature is from 2° to 6° Fahr. higher than that of the water for a gas production of 10,000 cb.m. (353,000 c.ft.). The quantity of water used averages about 4 cb.m. (880 gallons) per hour, corresponding with a consumption of approximately 10 litres of water per cb. m. (60 gallons per 1000 c.ft.) of gas. According to M. St. Claire Deville, a quantity of 2 to 3 litres per cubic metre of gas (12 to 20 gallons per 1000 c.ft.) is sufficient where the cooling surface is 16 to 18 sq.m. for a make of 1000 cb.m. (5 to 5½ sq.ft. per 1000 c.ft.).

The temperature of the water (drawn from a neighbouring canal) undergoes very considerable variations of temperature, according to the time of year—ranging from 32° to 72° Fahr. During the summer months especially, condensation is assisted by a low temperature. The crude gas, emerging from the tubular condenser at a low temperature, still retains a large quantity of tar fog, proving that the condenser does comparatively little in the way of separating tar. The gas remains in the condenser for a very short time—about a minute in the case of a make of 10,000 cb.m. According to M. St. Claire Deville, treatment of the gas made for about a minute at a temperature of 122° Fahr. brings about the separation of from 7 to 8 p.ct. of its tar in a condition of density almost equal to that of tar from the hydraulic main. The percentage would be greater in the case of the particular condenser used, but the total quantity of tar to be condensed is not a matter of great importance. The tar in the state of fog, after cooling, is separated from the gas by the Livesey washer just as tar in its normal condition.

Condensed ammonia liquor passes likewise through the Livesey washer, and is found to have a density of about 6° Beaumé, showing that a large quantity of ammonia is dissolved in the water. The "Standard" washers have therefore much less ammonia to extract, and thus can do with a relatively small quantity of water. The ammonia liquor in the tar cisterns proves to be of greater strength than that obtained by other methods of condensation, varying between 3·3° and 4·2° Beaumé—equivalent to 22 to 26·5 grammes of ammonia per litre. This is an additional advantage of the system which may well be taken into account.

The Livesey tar-separator was installed at the start, so as to condense all the tar vapour of which the installation was capable. As against English gas coals, the use of which gave some trouble, the German coals presented no difficulty. Despite ample lubrication of the extractors by means of the oils, the temperature of the

* See "Journal," Vol. CXIV., p. 602.

gas rose from 54° to 59° Fahr., giving rise to certain phenomena as follows.

A deposit of pitch, very thick and difficult to remove, formed at the inlet and outlet of the extractor and in the return governor. The same was the case in the Pelouze washer. The gas, having risen in temperature, re-dissolved all the volatile hydrocarbons which had condensed from it. At irregular intervals the extractor would stop working without it being possible to say when the stoppage was going to occur, and without there being any means of getting it going again.

A partial remedy for these troubles was found in re-passing the gas from the return governor, not into the inlet mains of the extractors, but into those of the tubular cooler, so as to produce a fresh reduction of temperature. Nevertheless, at odd times stoppage of the extractor still took place as a result of the different coals employed; and operations were thus extremely uncertain. The Livesey tar-separator was then abandoned, and the attempt made to use the large works' condenser as a tar-separator. The extractors then worked regularly, and enough tar was deposited to serve as a lubricant of the gas. Deposition of thick tar took place in the large condenser, going to prove that the latter was unequal to its work only as regards its use for the separation of the tar.

The Livesey tar-separator was then re-installed (April, 1915); but so arranged that the cooled gas was washed with water instead of tar, as could be done owing to the existence in the gas of some slight tar fog—sufficient to ensure the regular working of the extractors even when English gas coal exclusively was being used. The temperature of the gas then rose from 43° to 50° Fahr. in the extractors. The Pelouze again worked regularly; attention to the bells being very seldom required. The tar from the Livesey washer was very fluid, both in summer and winter, and independently of the kind of coal distilled.

In the use of English coals a deposit of thick tar was found to take place at the inlet of the tubular condenser. These deposits gave no cause for anxiety, since it was easy to disperse them by putting the condenser out of action and passing steam through it. Within two days the condenser was completely cleaned and ready for use again. The cause of these deposits should probably be attributed to the low temperature of the gas at its inlet. The somewhat great distance which the gas requires to traverse before reaching the condenser causes it to lose a large part of its tar—a fact which is distinctly unfavourable to successful working. But, unfortunately, the available plant could not be used in any other way. In the circumstances, the result exceeded expectations.

Following the re-building of retort-benches during the summer of 1915, the tubular condenser was out of use for some months, and it was thus necessary to fall back upon the previous method —namely, that of the large works' condenser and six annular condensers. The compulsory use of English coal of very doubtful quality caused almost daily stoppage of work as the result of deposition of tar in the atmospheric condensers, the syphons, and other parts of the plant.

Not a single further obstruction was caused on installing the tubular condenser with the Livesey separator. Also no difference worthy of mention could be discovered in either the calorific or the lighting power of the cooled gas when treated according to the earlier method or by that of M. Deville.

The gas obtained on this system is not entirely free from naphthalene; but the quantity still remaining is no longer a source of danger. Some years previously, it was impossible to tap a single town main without discovering naphthalene in large quantity. At the present time this trouble is very rarely encountered. The improvement is the more remarkable from the fact that the system of town mains is an exceedingly poor one, particularly as regards the placing of the mains, which are largely only 8 in. below the roadway and 16 in. and deeper in other parts. The least change of temperature thus has its definite effect upon the gas.

In the course of last March, an examination was made of mains of 16-in. diameter connecting the new parts of the system laid down in 1913 with an existing gasholder of 4750 cb.m. (167,000 c.ft.) capacity and another of 10,000 cb.m. (353,000 c.ft.) constructed during the same year. Most of these mains were in a part of the system which had been in uninterrupted use for 2½ years. In the case of the 10,000 cb.m. gasholder, there was a very small deposit of naphthalene in the syphon at the inlet and none at all at the outlet. In the case of the smaller holder, the naphthalene deposit at the inlet syphons was slightly greater. At the outlet, both the syphons and the vertical portions showed a notable deposit of naphthalene. In regard to the latter case, it is to be noted that this main connects the existing gasholder with the town governor. The holder, which had been in use since 1900, had not been examined since this time, and there had been no removal of naphthalene deposits produced in it. Moreover, the inlet and outlet mains could not be thoroughly cleaned before taking the new mains into use. It may thus be concluded that notable quantities of naphthalene were deposited at the inlet and outlet of the holder from the fact that, on taking down the inlet and outlet mains, naphthalene was removed literally by the cartload. It would thus appear that the naphthalene was formed there by displacement, particularly as it was observed that certain parts of the deposit were older than others. The details which have been given will, it is hoped, supply an interesting review of the results obtained over several years by "abrupt" condensation.

PAPER GAS-PIPES.

The current "Journal of the Society of Chemical Industry" contains an abstract of a report by M. Rudeloff, of the German Imperial Institute, on the testing of materials for tubes, prepared according to the process of A. Von Valois.

The tubes are made by rolling paper to the desired diameter and thickness of wall, fastening with a suitable adhesive, and applying a protective coating. They are intended to serve as pipes for gas and water. According to calculation, the specific resistance to direct hydraulic bursting pressure is 360 kilos. per sq.cm. (5120 lbs. per sq.in.). It is stated that the tubes were not appreciably affected by the prolonged action of coal gas. Some which stood full of water for several weeks showed no perceptible swelling or loss of resistance. The pipes are only one-sixth to one-tenth the weight of lead pipes, and are found to resist three to four times the pressure for equal diameters. The weak point of the paper pipes appears to be the junctions, which consist of tube sections slipped over the two ends to be joined—the annular space being packed with some suitable composition. The jointed pipes burst at a considerably lower pressure than the single pipes, and in some cases gave way at the joints.

Tests for resistance to external pressure showed an average of 27·8 atmospheres, which is regarded as sufficient resistance for the pressure of the earth, provided the material does not become softened in course of time.

A further set of trials was made with "Pertinax" tubes, made from paper impregnated with synthetic resin, and rolled under tension. The smallest internal diameter obtainable is 5 mm. (0·2 in.). The tests have not established the suitability of paper tubes for use with water, nor for constructional work, owing to the low compression strength of the tubes (4·6 kilos. per sq.cm. = 65 lbs. per sq.in.). The summary does not contain particulars of tests of any prolonged action of moisture on the tubes, which, as regards their suitability for gas-mains laid in the ground, would appear to be a chief factor.

PROGRESS OF CHEMISTRY AND GAS ANALYSIS.

In the course of an article in the "Chemical Trade Journal" on the progress of analytical chemistry, abstracted from the Chemical Society's "Annual Reports on the Progress of Chemistry for 1916," by Mr. C. A. Mitchell, F.I.C., the following is included among the remarks under the heading of gas analysis.

Attention has been directed to a source of error in the analysis of generator gas through incomplete absorption of the carbon monoxide by ammoniacal cuprous chloride, and the combustion method is therefore more trustworthy for the estimation of hydrogen, methane, and carbon monoxide in such gases. The method of fractional combustion with copper oxide has been shown to yield accurate results with gaseous mixtures of all kinds. The most suitable temperature for the combustion is 275° to 300°.

As direct methods, when practicable, are more satisfactory than indirect methods, a new process of estimating carbon monoxide in the presence of unsaturated hydrocarbons seems worthy of thorough investigation. It is based on the fact that when a gaseous mixture is repeatedly passed through a tube charged with soda-lime (containing about 20 p.ct. of sodium hydroxide) heated to 230°, any carbon monoxide present is absorbed and retained by the soda-lime. Obviously, the gas must first be freed from carbon dioxide and oxygen by being passed through absorption pipettes charged with the usual reagents. The method appears to be capable of general application, and, should further investigation confirm its trustworthiness, it should find a permanent place in schemes for the analysis of gases.

A rapid and accurate process for estimating sulphur in small quantities of coal gas has been based on its oxidation by combustion with an excess of air in a quartz tube containing platinum in the form of gauze and wire fabric. The most efficient reagent for absorbing sulphur compounds in gas is phenylhydrazine. The combustion test in the presence of porous platinum may also be used for the detection of sulphur in 10 c.c. of gas.

Calorific Standard Application and Order.—The Board of Trade have received an application for a calorific standard of 500 B.Th.U. from the Heckmondwike and Liversedge Gas Company. The Board have made the Order asked for by the Northampton Gas Light Company.

Toluene from Water Gas.—An investigation has been conducted by Mr. E. J. Hoffman, on behalf of the United States Bureau of Mines, with the object of ascertaining whether there was any justification for the prevalent prejudice that toluene from water gas was unsuitable for nitration, because it contained some hydrocarbons of the aliphatic series, the removal of which could not be effected by the usual methods of purification. The experiments early showed that, if the sample of water-gas toluene under investigation contained any aliphatic hydrocarbons, they were present in negligible quantity, so far as affecting nitration was concerned. As a matter of fact, he found that the impurities did not amount to 1 p.ct.; and so the nitration proceeded as with ordinary toluene.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Price of Gas at Doncaster.

Sir,—I note that there is a slip in the "Journal" for this week; some reference being made to an alteration in the price of gas, under the name of Doncaster.

The particulars given do not refer to this town.

Gas-Works, Doncaster, June 29, 1917. Robt. Watson.

[The paragraph alluded to was received from a South Yorkshire correspondent, who in his copy several times mentioned the name "Doncaster." He is being communicated with; but until his reply comes to hand, it is impossible to say to what town the particulars do refer.—Ed. G. J.]

The Adulteration of Gas Coal.

Sir,—The article in your issue of June 19 is at once opportune and to the point; while the figures constitute a potent indictment of the myopic policy of the department responsible.

The general depreciation in the quality of gas coals was marked immediately after the war; but the fuel now supplied is comparatively inferior from every productive standpoint. A reduced yield of 1000 c.ft. per mouthpiece represents a very serious strain on the resources of many works; and there appears every probability of restricted outputs at mid-winter being the rule rather than the exception.

Apart from the question of additional retort-power involved, there is the not less pressing problem of labour. When practically every undertaking in the country has at the moment insufficient skilled stokers to meet the winter demand (even with normal pre-war qualities of coal), the outlook is indeed far from reassuring.

From whatever view-point the matter is considered, the handling of coal containing large quantities of inert material cannot but be condemned; and all the objections which could be raised in normal times are emphasized and accentuated in the present emergency. The costs of carriage, haulage, and storage (legitimately increased owing to war conditions), are thus seriously augmented to no purpose; while valuable transit space is employed for no better end than to shift rubbish from one part of the country to another.

The operation of picking does not call for any high degree of skill, and could be accomplished entirely by women and over-age men.

The matter is one that vitally touches the gas industry; and it is to be hoped that fuel-users generally will make strong representations to the authorities, pointing out the economic unwisdom of prevailing conditions.

"Aconcagua."

June 25, 1917.

REGISTER OF PATENTS.

Tar Dehydration and Ammonia Distillation Plant.

No. 106,642.

Ball, F. L., of Maidstone, and Hiller, H. King, of Victoria Street, Westminster.

No. 6974; May 16, 1916.

This form of plant can be used either for the dehydration of tar, the debenzolizing of oil, or the distillation of ammoniacal liquor, in such a way that the operations can be "effected without the danger (even when the process is forced excessively) of priming, frothing, and bumping, which . . . attaches to direct-fired stills as at present constructed."

The liquid is caused to pass into a still A in a long shallow continuous stream of predetermined depth. The still is provided with an inlet B for the raw liquid; an outlet C for the treated liquid; and a pipe D for the effluent vapours. The still contains a series of zigzag channels formed by staggered deflector plates F, of steel, standing vertically on the bottom of the still. The lower edge of the plate and the bottom surface of the still are perfectly level, "so as to form a practically tight joint, and yet be free to expand or contract without buckling or setting up strains inside." They are held in place at alternate ends of the still by double angle cleats, and are slightly deeper than the stream of liquid flowing between them—6 in. when the stream of liquid is 6 in., with a distance between the plates of 12 in. Further, to avoid priming and frothing, there is given to the liquid alternately to the horizontal flow also a vertical flow, by means of a series of hollow cast-iron heat dispersers G.

These heat dispersers (see detail) are hollow castings, with a rectangular base and vertical sides of sufficient width to completely fill the cross section between each pair of deflector plates—that is to say, if the channels are 12 in. wide the dispersers will also be 12 in. wide. There is a wide opening H in the base in the inward direction of the flow, and a small relief opening I in the outward direction. The vertical section is slightly conical, to accelerate the upward direction of the fluid; and it terminates in a narrow throat J, from which the fluid is discharged in a thin film over a slightly sloping table K. The base of these devices is of solid metal with the exception of the openings, and so they absorb heat through the bottom of the still, which is transferred to the column of tar or other liquid in them. This, owing to its heated condition, becomes of a lighter specific gravity than the upper layers within the still, and therefore rises within the heat dispersers sufficiently high to flow over the tables K.

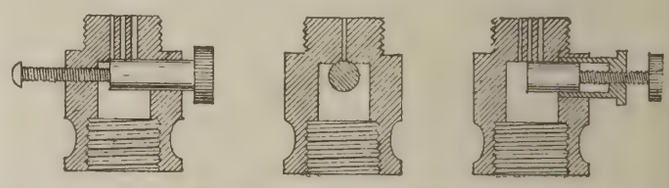
The still is heated externally by a direct fire L, the combustion gases of which pass through flues E to the chimney M. The flues correspond to the channels within the still in such a way that, the inlet for the fluid being at one extremity of the series, and the outlet at the further extremity, the liquid is progressively heated, and therefore the volatile matters can be distilled according to their respective vapourizing temperatures. In this way, there is obtained a more gentle evolution of vapour than is possible if a large volume of liquid is heated at one time to a similar maximum temperature. The tar or oil vapours, on leaving the still by the pipe D, pass through a condenser coil in the usual way; while if the still is being used for the dissociation of ammonia, the vapour passes into an acid saturator of ordinary form.

Atmospheric Gas-Burners.—No. 106,734.

Hooker, W., of Aldershot.

No. 12,143; Aug. 28, 1916.

This invention has for its object to construct an atmospheric gas-burner that will secure the proper mixture for combustion purposes by adjusting the valve of the gas-nipple only—the openings for air being permanent.



Hooker's Atmospheric Gas-Burners.

Three or more gas-holes are made in the nipple, in line and of varying sizes—each size, commencing at one end, increasing in diameter. Inside the nipple is a screw or sliding valve, which can be moved along from the outside to close or open one or more of the holes—the closing commencing at the end having the largest hole. In its simple form the valve consists of a round rod having one end reduced in diameter and screw-threaded for engaging a screw-threaded hole in the nipple casing. The other end projects through a hole in the nipple casing and carries a turn-button or handle. The rod is of such a diameter that it will cover all the holes in the nipple, and the screw-threaded end is of such a length that the larger diameter of the rod will uncover or cover the holes by turning it. Two forms of the burner are shown.

Thus "one style of burner can be made to suit varying qualities of gas, and the valve be then adjusted to suit the quality of the gas for a particular district; and in all cases the ordinary gas-cock can be turned full on."

Gravity Bucket Conveyors and Elevators.

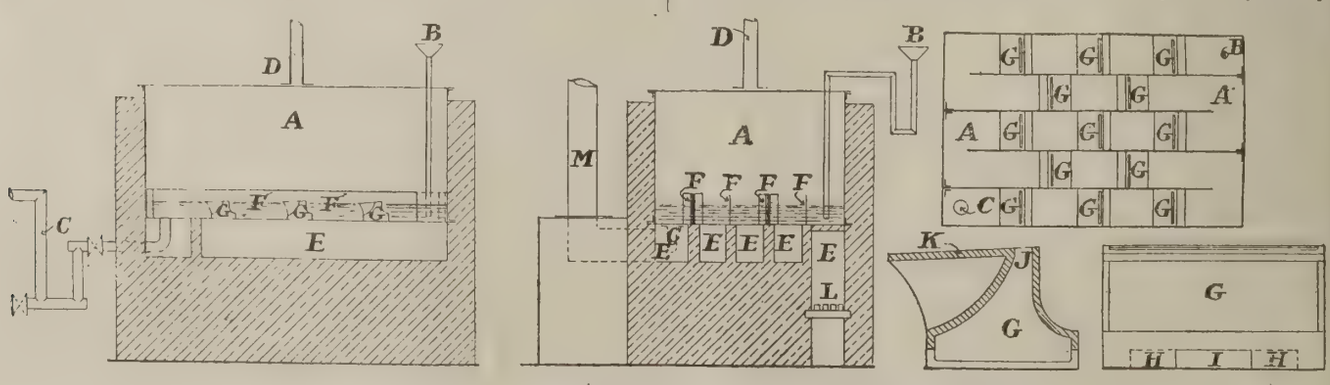
No. 106,655.

Drakes, Ltd., and Drake, J. W., of Ovenden, Halifax.

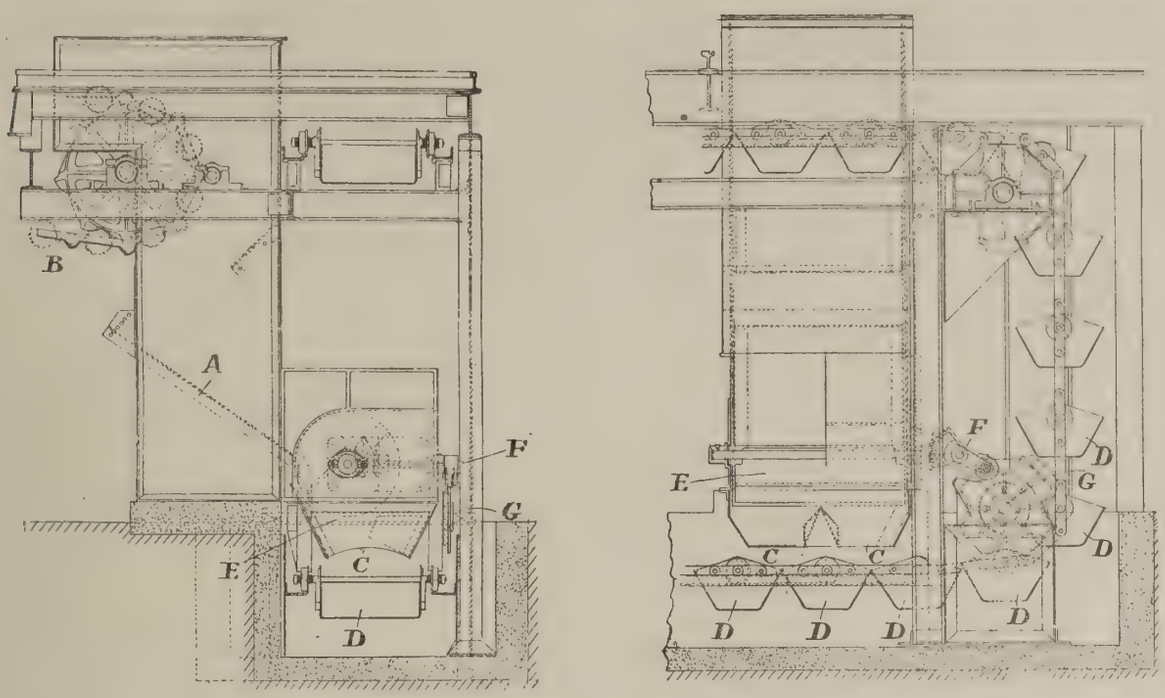
No. 7542; May 27, 1916.

This invention consists in so constructing the shoots or hoppers through which the coke has to be fed on discharge from the retorts that it is possible "with the greatest precision" to measure and deliver the desired amount to each bucket in turn without any of the coke falling away from, or being deposited outside of, the particular bucket into which it is desired to supply it.

The shoot A [see p. 25] is arranged so that any ordinary conveyor



Ball and King-Hiller's Combined Tar Dehydration and Ammonia Distilling Plant.



Drakes' Gravity Bucket Coke Conveyor and Elevator.

B (which first receives the coke from the retorts) is enabled to deposit it therein in such a manner that the shoot will deposit it in the orifices C beneath. The portion of the hopper beneath the shoot is preferably divided into two passages, so that the orifice of each will be of an area that will lie within the area of any bucket D to which it has to supply the desired quantity of coke. The length of the orifice of each shoot is slightly less than the length of the bucket, while the width of each orifice is considerably less.

Mounted to oscillate within the hopper E and above the mouthpieces C is an oscillating valve operated by having a gearing wheel or toothed quadrant to engage with a quadrant on a shaft F, which shaft has an arm also fixed upon it, so that an anti-friction bowl may be mounted to take against a cam fixed upon the shaft G that carries the sprocket wheels which form the part of the mechanism for moving the chains carrying the buckets D.

The oscillating stop-piece above referred to receives and arrests the descent of any coke that is deposited upon, and descends down, the shoot A. Thus when the apparatus is set in motion the rotating of the shaft G to bring the buckets D beneath the orifices C causes the stop-piece to cut off and transfer the exact quantity from the coke, which is conducted to it by the shoot A, necessary for filling the two buckets beneath the orifices. The continued motion of the stop-piece has the effect of depositing the coke into the hopper, where it is divided into two parts—one portion being discharged by each orifice to its respective bucket beneath. The quantity of coke thus cut off and deposited passes through the lower outlets and descends into the respective buckets beneath.

At the time that the stop-piece begins to deposit coke into the buckets, those which are to receive it will be in position with their leading edges opposite the rear edges of the mouthpieces, since the width of each bucket extends beyond the width of the mouthpiece, as the time that it takes the coke to descend its bucket is allowed for by the passage of each bucket from the position where the rear edges of the orifices are directly over the leading edges until the leading edges have moved sufficiently forward for the rear edges to be in such a position as to have received their respective quantities of coke. Notwithstanding the continual movements of the buckets, the supply of coke is carried out during the time each bucket is travelling beneath its respective mouthpiece, and is cut off immediately prior to the space between the buckets being brought beneath the mouthpieces.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for June 27.]

Nos. 8706—9070.

ANDERSON, W.—"Process of carbonization." No. 8789.
BAGLEY, D.—"Combined still and process for debenzolizing absorbent oil and rectifying crude benzol." No. 8735.
BASSET, L. P.—"Process for the manufacture of sulphuric acid from sulphate of lime." No. 8999.
CHEMICAL ENGINEERING COMPANY.—"Separation of aniline, &c." No. 8959.
DEMPSTER & SONS, R.—"Valves for controlling, reversing, and bye-passing flow of gas through purifiers, condensers, &c." No. 8914.
EDWARDS, E. A.—"Production of incandescent light." No. 9003.
ETLINGER, G. E.—"Means for adjusting gas-lamps." No. 8814.
GEORGE, S. A. R.—"Gas-cookers." No. 8811.
HALL, W. A.—"Process of cracking high-temperature coal-tar oils." No. 8932.
HANKAR, R.—See Hall. No. 8932.
HORSFALL, J. E.—See Dempster. No. 8914.
LAUNHARDT, G.—"Gas-burner for heating baking-ovens." No. 8851.
LUMB, H.—See Dempster. No. 8914.
LYMN, A. H.—"Gas-producers, &c." No. 8924.
METERS, LTD —"Valves." No. 9056.
MILLER, J.—"Brackets for incandescent gas-mantles." No. 8732.
PEASE, E. L.—"Means for transmitting and utilizing heat." No. 9016.
POOLEY, H. J.—"Recovery of volatile solvents." No. 9005.
PRAGER, H.—See Chemical Engineering Company. No. 8959.
RAMBUSH, N. E.—Lee Lymn. No. 8924.
SCOTT & SON, G.—See Pooley. No. 9005.
SPENSLEY, J. W.—See Chemical Engineering Company. No. 8959.
TURNER, C.—"Distillation of carbonaceous material." No. 8743.
WOODHEAD, F.—"Appliance for use with gas-stoves for keeping food warm," No. 8885.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Kenilworth Gas Bill.

The Kenilworth Gas Bill was returned from the Commons agreed to with amendments. The amendments were considered, and agreed to.

HOUSE OF COMMONS.

Provisional Orders Bill.

The Gas and Water Provisional Orders Bill was read the third time, and passed.

Lisburn Provisional Order Bill.

The Provisional Order of the Local Government Board granted to the Lisburn Urban District Council, authorizing the increase of the charge for gas from 4s. to 6s. per 1000 c.ft. came before the Committee on Unopposed Bills of the House of Commons, and was passed. It was explained that the gas undertaking was taken over from a private Company by the Lisburn Council in 1909; the maximum rate being 4s. This had resulted in a charge upon the rates; and the new maximum would obviate any such charge.

LEGAL INTELLIGENCE.

LIABILITY FOR NEGLIGENCE OF WORKMEN.

HIGH COURT OF JUSTICE.—KING'S BENCH DIVISION.

Wednesday, June 27.

(*Before* Mr. JUSTICE SHEARMAN *and a* COMMON JURY.)

Kimber v. The Gas Light and Coke Company.

In this case Maude Emma Kimber sought to recover damages in respect of personal injuries sustained through stepping into a hole in the floor of a house at No. 132, Brondesbury Road, which was said to have been left unguarded by defendants' workmen. Defendants denied negligence, and said if their workmen allowed plaintiff to enter the premises they did so without authority. They also pleaded contributory negligence on the part of the plaintiff.

Mr. HOLMAN GREGORY, K.C., and Mr. ELLIS HILL appeared for the plaintiff; and Mr. THORN DRURY, K.C., and Mr. CHARLES DOUGHTY represented the defendants.

Mr. GREGORY said the house in question had been let to a Mr. Hall

by the London Electrlc Railway Company, who had agreed to put it into thorough repair. For this purpose they had instructed Messrs. J. G. Scott & Son, builders, of Brondesbury, to do the work; one condition being that the Gas Company should be employed to do certain work. Mr. Hall put the house into the hands of Messrs. Bates to let the upper portion as flats; and plaintiff having obtained an order to view, went to the house, knocked at the door, and showed the order to one of defendants' servants, who said the flat which was to let was on the first floor. No intimation was given by the man of any hole being in the floor; and in the semi-darkness plaintiff stepped into the hole and sustained serious injury. Counsel contended that plaintiff was lawfully upon the premises, that she had no notice of the trap, and, in these circumstances, defendants were liable.

Miss *M. E. Kimber*, the plaintiff, said in March, 1916, she was looking out for a flat and went to Messrs. Bates and obtained orders to view. She went to No. 132, Brondesbury Road between 3, and 4 o'clock and knocked at the door. Two men came to the door, and on presenting the order to view she asked which part of the house was to let. One of the men said "the upper part." On proceeding upstairs to inspect the rooms, she stepped into a hole about 2 to 3 ft. long by 6 in. wide. There was no guard round the hole. It was dark at the time, and she could not see the hole. Witness was taken to the hospital, where she was kept for six weeks, and had to undergo an operation, and had since suffered great pain. She had attended the hospital as an outpatient for six weeks, during which time she had been unable to work The men did not warn her about the hole in the floor.

Cross-examined: The house was empty when she went to view it; it was being converted into flats. Had it been lighter, she might have seen the hole.

Mr. Thorn Drury intimated that he did not propose to call evidence on behalf of defendants.

Mr. Gregory, in summing up plaintifi's case, contended that defendants had been guilty of the clearest negligence; their servants, being in charge of the staircase and doing work on the premises, having removed a board.

Mr. Thorn Drury submitted that there had been no negligence on the part of defendants. The house was entirely unoccupied, and was in the hands of workmen, who were fitting it up for incoming tenants. Any one going into such a house could not expect to find the same state of circumstances to exist as would be found in an occupied house. Defendants had no power to admit people to the house or to prevent their entering. What was the suggested negligence? It was said that this being an unoccupied house, the workmen should not have left the hole unguarded. But it had never been the practice to erect a fence when a board was taken up. With regard to the suggestion that plaintiff was not warned, he submitted that any person viewing vacant premises must be credited with possessing a certain amount of common sense, and, accepting the definition of "negligence" as "want of care according to the circumstances," there was clearly contributory negligence on the part of the plaintiff.

His Lordship, in summing up, pointed out that it was well settled law that a person could not recover damages if he was part author to his own injuries. Even if defendants were negligent, they would not be responsible if plaintiff had not exercised reasonable care. He left four questions to the Jury, which they answered as follows:

1.—Were the Gas Company's servants negligent in failing to protect the hole?—No.

2.—Were the Gas Company, by their servants, negligent in not warning the plaintiff of the existence of the hole?—Yes.

3.—Was the plaintiff guilty of contributory negligence?—No.

4.—Damages, £275.

Mr. Holman Gregory submitted that judgment should be entered for the plaintiff on these findings. Defendants had created a source of danger, and, according to the view of the Jury, plaintiff should have been warned of it.

Mr. Thorn Drury contended that judgment should be entered for defendants, as they owed no duty to the plaintiff. There was no precedent for such an action as the present, as the point had never been directly raised or decided. There could be no negligence without duty. Defendants were on the premises under a contract with the owner to do certain work, and were not liable for any acts of ownership. The act which defendants had done was a perfectly lawful one; and the only thing which had been found against them was one of omission. He did not admit that the hole in the floor was a concealed danger.

Mr. Gregory agreed that no case had ever been decided which bore directly on the point raised; but as defendants owed a duty to a person who was lawfully on the premises, they were responsible for any damage which occurred. In support of this contention, he cited the decision of the House of Lords in *Lowery v. Walker*.

His Lordship, in giving judgment, said he had, after some hesitation, come to the conclusion that the plaintiff was entitled to succeed. It appeared that the Electric Railway Company had a house which was out of repair; they entered into a contract with Mr. Hall to let it to him, and agreed to do the repairs. A firm of builders was employed to do the work; one stipulation of the contract being that this firm should instruct the Gas Company to make the necessary alterations to the gas-fittings. The owner permitted the defendants to do the work; but that did not prevent him using the premises, or giving permission to other persons to lawfully use them. Plaintiff, having an order to view, was lawfully on the premises, though defendants' workmen had no authority to give her permission to enter. It appeared that the workmen had taken up a board, leaving a hole at the foot of the stairs. Into this hole plaintiff stepped; and she now claimed damages alleging negligence on the part of defendants' servants. It was said defendants had no part in inviting plaintiff to be on the premises; but the case rested on simple lines: The lady had a right to be there; the hole was made by defendants' servants; and therefore the proper persons to be sued were the persons whose negligence had caused the injury. The result of taking up a board was a "concealed danger," as a place was left which was dangerous in itself to anybody who walked over it. The Jury having found there was negligence in not warning the plaintiff of this danger, judgment would be entered for plaintiff for £275, with costs.

His Lordship granted a stay of execution with a view to an appeal.

KOPPERS COKE-OVEN PATENTS.

The Patents Court, consisting of the Controller (Mr. Temple Franks) and Sir Cornelius Dalton, finished last Wednesday the hearing of the opposition to the issue of a licence to Messrs. Simon-Carvès, Ltd., to manufacture under the Koppers coke-oven patents. The previous submission of Mr. H. V. Derry's contention that the Court had no jurisdiction to touch the patents, because the English rights were already vested, was reported in the "Journal" last week, pp. 628-9.

Mr. H. Terrell, K.C., M.P. (Counsel for Mr. Derry), produced correspondence which had passed between the Koppers Coke-Ovens and Bye-Products Company and Koppers himself. The Company was said to consist of Koppers, Derry, and a German (now interned) named Altenhein, and to have been formed as a partnership.

Major *Barker*, the Solicitor who drew up documents for a proposed transfer of the partnership concern to the limited liability company, said he had interviews from to time with all three partners, and he always understood that the partnership had the right in the patents. The patents were the partnership assets, and went with the remainder of the partnership assets.

By Mr. Hunter Gray (for Messrs. Simon-Carvès, Ltd.): During all his interviews with the partners, the question of the ownership of the patents never came up specifically for discussion.

Similar evidence was given by Mr. *Shuttleworth*, the Auditor to the partnership and afterwards its Controller.

Counsel then argued that for the Controller to find jurisdiction he must be satisfied that Koppers at the commencement of the war was the sole person entitled to the benefit of the patents. If the equitable interest was in the partnership, then the sole interest was not in Koppers.

The Controller: Even if they were partnership assets, would it not have been possible for Koppers to have dealt with them himself? Is it not conceivable that there may be two kinds of beneficial right in the property of a partnership?

Counsel said he thought that had there been no war, and Koppers had attempted to deal with the patents, the partnership could have restrained him.

The Controller: The real question of proprietorship seems never to have been raised. Is there not a middle course possible here—that they never intended the patents to be wholly transferred to the partnership, nor did they intend them wholly to remain in the control of Koppers? The partnership was to have control for working, and the proceeds were to be divided between Koppers and the other two. With such a practical understanding, the question of proprietorship never would arise. If the situation is open to two sorts of legal interpretation, why should we find for one rather than the other?

Mr. Terrell replied that the Court never could establish jurisdiction where it was doubtful. On the point of legal ownership, something was to be said no doubt for the Controller's point of view; but the moment that they turned to equitable ownership, jurisdiction became problematic.

The Controller: Is it not for you to demonstrate that, upon the documents submitted, something occurred which amounted to a transfer of ownership?

Mr. Terrell submitted that it was not intended the partnership should have a licence, or the licence would have been revocable. Koppers, in his letter returning the agreement, said: "The duration of our business relationship is to be unlimited—that is to say, indissoluble by any notice to terminate." There was no licence which could give to the licensor the goodwill of the business.

Mr. Gray argued that on the evidence it was plain the beneficial interest as well as the legal was in Koppers. But if it were not, and it was a partnership asset, even in those circumstances the Court had jurisdiction. Derry had said: "The patents were of no importance to us; we did not attach value to them." What they wanted was agency. Koppers, the engineer, was to give his experience; and it was not surprising that he was to get half profits. There was no transfer of any one of the patents to the partnership. Assuming that the patents were partnership assets, the Court still had jurisdiction.

The Controller: It is clear that we find in the correspondence Koppers taking one line as to patents and Derry and Altenhein taking another view.

Mr. Gray: And the position is consistent with licence, and nothing more. The Master of the Rolls, said: "Nothing I have heard in the documents read by Mr. Terrell, or the argument he adduces, satisfies me there was any interest in these patents in the partnership. There was no capital in the partnership; and to my mind it is incredible there was anything more than something in the nature of a licence or permit to use these patents to the English firm." Lords Justices Bankes and Warrington spoke even more strongly.

The Controller reserved his judgment. It might, he said, be necessary on a future occasion to call on Messrs. Simon-Carvès to present their application for a licence.

Trade Mark Infringement.

Mr. Justice Sargant, in the Chancery Division, last Tuesday, had before him, on a motion for judgment, the case of *Rippingille's Albion Lamp Company, Ltd., v. Clark's Syphon Stove Company, Ltd.* For the plaintiffs, it was stated that the only question for consideration was as to costs. The claim was in reference to the infringement of a trade mark. Plaintiffs had used the trade mark "Sunrise" for gas-stoves; and until the defendants applied the name to stoves of their manufacture, there were no other stoves except the plaintiffs' which were sold under the title of "Sunrise." The defendants pleaded ignorance of plaintiffs' rights, but admitted the use of the word. They regretted that there had been an infringement, and said they had given instructions for the name to be changed. They were willing to submit to an injunction. His Lordship stated that he proposed to give plaintiffs the costs up to March 8, and also costs on the application for judgment as a short cause. The intermediate costs he would give to the defendants.

MISCELLANEOUS NEWS.

PLYMOUTH GAS COMPANY.

The Annual Meeting of the Plymouth and Stonehouse Gas Company was held last Thursday, at the works—Sir JOSEPH A. BELLAMY (the Chairman) presiding.

In their report, the Directors referred to the increasing difficulties experienced by gas undertakings owing to the continuance of the war, and said that the abnormally high charges for transport of coal and oil, together with the greater cost of labour and material, necessitated an increase of 8d. per 1000 c.ft. in the price of gas at Midsummer, 1916, and a further increase of 2d. as from Lady-day this year. The consumption of gas during the past twelve months was practically the same as for the previous year. The initial difficulties incidental to the transfer to the Company of Harvey's tar distilling works have been overcome; and the working results so far have proved very satisfactory—affording the Directors every confidence that their action in acquiring for the Company this most important business will be completely justified.

The CHAIRMAN, in moving the adoption of the report and accounts, said that on capital account there was an increase of £20,500 in the issue of debenture stock, for the purpose of taking over the tar distilling works of the late Mr. Harvey; and there had been an expenditure of £5156 on stoves, automatic meters, &c., which had increased the balance to the debit of capital account to £50,910. With regard to the revenue account, there was an increase of nearly £49,000 in the cost of coal and oil, due to the high charges for transport. Wages in the carbonizing department showed an increase of £1136, which was part of a total increase of over £4000 in the Company's wages during the year. On repairs of works there was a decrease of £328; and but for the large increase of wages, of over £1000, the decrease under this head would have amounted to about £1500. There was a decrease under the head of high-pressure mains and lamps. This department promised to be a great success before the war; but the restrictions on outdoor lighting had very adversely affected it. Rates and taxes had increased by £6330, which was accounted for by Excess Profits Duty £3429, and the increased rate of tax on a larger amount carried forward. The co-partnership bonus increased by £205, owing to a higher rate of bonus being allowed under the revised rules. The total amount of bonus for the year was £999; and it was credited to 219 co-partners, including 56 men on active service. With regard to the credit side of the account, they received £36,600 more from private consumers, the result of the increase in the price of gas during nine months of the year. Public lighting brought in £2700 less, owing to the official restrictions. From coke they had £2700, and from breeze £700 more; the higher price and larger quantity sold accounting for these increases. Tar showed an increase of nearly £1200, of which £900 was for benzol; and sulphate of ammonia, an increase of £2665, due to the higher price realized. The net result of the year's working was that, after allowing for dividends and interest upon the debenture stock, and carrying £3500 as usual to the renewal fund account, the balance carried forward was £39,146, as against £44,829 in the previous year.

COAL AND FREIGHTS.

Formerly they had all the coal supplies from Durham collieries by sea; but this method of transport ceased when the Government found it necessary to commandeer the ships. He had several interviews with the Board of Trade, but no practical help was forthcoming from them; and the Railway Committee and others to whom he applied were equally unable to help them. Finally, they got over the difficulty of transport by hiring 250 railway wagons, each of 15 tons; and they had achieved considerable success in getting coal from Durham by rail. At first the double journey took 21 days; but so thoroughly was the service organized that the average time was now 12 days. Splendid assistance had been rendered by the railway companies. Now another difficulty had arisen. The Government had recently told them they could not be allowed to keep the railway wagons, and they must buy coal nearer home, and so avoid these long railway journeys. He did not know how this would work out; but his opinion was that, as regards the time occupied, the wagons would be as much in use on shorter journeys as on the well-organized runs from Durham to Plymouth. But the action of the Government meant the use of coal raised near at hand, much of which was unsuitable for their purposes. For instance, they needed coal of good coking quality. If they produced much breeze, they could not sell it; and for the manufacture of carburetted water gas, they must have a really good coke. Another difficulty created by the action of the Government was that it threatened to deprive the Company of the benefits of the Coal Prices Limitation Act. They had the advantages of the Act in their dealings with the Durham collieries, which were supplying them before the war; but if they were driven to make purchases in Yorkshire or elsewhere, they would have no right to demand the same consideration, and the question would arise whether the Government would compensate them. It would be very unjust for the shareholders to be punished, and inequitable if they had to sacrifice thousands of pounds for the benefit, perhaps, of other gas undertakings which happened to be nearer the coalfields. This position would be laid before the authorities. Whatever the source of the supply, the coal would still have to be brought by rail. They had a very fair stock of oil on hand, and hoped it would enable them to overcome the difficult days ahead. In the meantime, they were using as little oil as possible.

NEW CO-PARTNERSHIP RULES.

The increase of £4000 in the wages bill touched the co-partnership scheme. The scheme worked very well indeed until the Government, with a lack of judgment, rushed up wages in their own establishments far beyond what was necessary. But when men in their employ who were getting not more than £3 a week saw unskilled men in Government employ bringing home £9 a week, it was only human nature that they should want to know the reason why. Personally, he had no grievance against their employees. Many of them, however, thought proper to join the Dockers Union; and this produced a condition of things which rather upset the intentions of the Directors and shareholders when the profit-sharing system was introduced—the intention that it should be a means of bringing the workmen and Directors into closer touch, so that all differences might be equitably adjusted. This intention was realized till the Dockers Union thought it was necessary to demand a big increase in wages. The result was a Board of Trade arbitration; and the advance was granted. The gas undertakings in the district had no weight. It was then pointed out by a committee of the men that, owing to the increase in the price of gas, there would be no bonus under the co-partnership rules as they stood; and in September last a new scale was adopted, and the rules revised. About two-thirds of the employés, including those on active service, accepted the new conditions and received the bonus, and one-third remained outside. The Directors considered co-partnership was on its trial. The benefits on both sides were destroyed if they had to look upon these men as strangers and not partners, with whom they could settle differences in a friendly way as man to man, and these men joined unions, under whose rules they were obliged to come out on strike because a dispute, not even connected with the gas industry, occurred at some distant place—like Liverpool. If further trouble occurred, and the co-partnership scheme could not be worked equitably, it must be dropped. It was the shareholders' money which went to pay the bonus; and it was for them to say whether they would continue it.

GOVERNMENT AND THE SLIDING-SCALE.

Gas companies generally had felt the influence of the war in its relation to the sliding-scale. Undertakings in the position of Plymouth, in being remote from the coalfields, were specially affected. Because they were at Plymouth and not at Newcastle, they had to pay for the conveyance of coal by rail about four times the amount previously paid for its conveyance by ships. Gas undertakings near the coalfields were not suffering under this disability to anything like the same extent. If gas companies' expenses, through these high freightage and other war charges, continued to pile up, their dividends might disappear altogether. It was not fair to those who had invested their money under the statutory conditions and obligations of the sliding-scale. Municipal authorities, who were competitors with them, raised their money from the public; and war or no war, the interest was paid. Why was the sliding-scale introduced? It was to give ratepayers and consumers fair treatment and a share in the prosperity of gas companies. These statutory obligations were imposed at a time when there was an implied guarantee of a monopoly of lighting. Developments came, and electricity was introduced; and many thought that, when the old monopoly no longer existed, and municipalities were empowered to run opposition lighting undertakings, the obligations under the Gas Acts should be modified. Since the war began, gas companies had become better organized. The National Gas Council were considering the question of appealing to Parliament to rectify the grievance of the sliding-scale; and he hoped a firm attitude would be taken up. In existing circumstances, the sliding-scale ought to be suspended or very much modified. They were entitled, as an industry, to a fair chance of living; and as, for the country's benefit, serious obligations were placed upon them which had the effect of reducing their dividends, there should be corresponding consideration of their position. As a member of the Council, he should take a very strong line on this subject. Lord Moulton had recently declared that the gas companies had been the salvation of the country in the contribution which they made to the supply of explosives. In return for these services, they were surely entitled to some consideration. In Plymouth, they heartily responded to the appeal of the Ministry of Munitions, and lent the services of their Engineer (Mr. P. S. Hoyte) for the supervision of the work of producing explosives from the gas-works of Devon and Cornwall. In this matter they did not consider the question of profit; and they were entitled to be treated with generosity by the Government in return.

SCIENCE OF THE GAS INDUSTRY.

With regard to the future of the gas industry, he was not in the least pessimistic. Modern methods were being introduced and a far-sighted policy adopted; and he looked forward with no misgivings. Too little had as yet been done in the development of science, and especially of chemistry. The gas companies were now in closer association; and he trusted the municipal undertakings would be willing to join hands with them, so that they might unite in the promotion of scholarships and other means of providing technical education for the advantage of the industry. He had no doubt that if a reasonable proposal for a contribution for such a purpose were put before them, the shareholders of the Company would readily respond to it. It was a vital thing, in his judgment, that the industry should have at its command the best talent the country could produce, and that encouragement should be given to young men to work and to study by the offer of the reward of well-paid situations.

EXCESS PROFITS DUTY.

As to the Excess Profits Tax, it certainly was an anomaly that they should be called upon to pay it when they were receiving less dividend. What actually happened was that last year they carried forward a larger balance to meet burdens which they foresaw would fall upon them, and to avoid fluctuations in the price of gas. The Inland Revenue Authorities, to their astonishment, regarded this additional balance as excess profit. They were right in theory; and they got the money. But the Company had a right to claim its return this year, now that they had a deficiency; and they would make this claim.

The report and accounts were passed, and a dividend was declared of 4¾ p.ct. per annum on the ordinary stock for the half year, with corresponding dividends on the additional and new shares.

One of the workmen representing the co-partners thanked the Directors and shareholders for the action which had been taken in regard to the bonus, and said that if the men who stood out looked into the matter a little closer they would be of his opinion—that the scheme was beneficial to them.

Thanks were accorded the Directors and officers; and formal approval was given to any action the Chairman may take in the interest of the Company as a member of the National Gas Council.

EDINBURGH AND LEITH GAS COMMISSIONERS.

Increased Bonus to the Clerical Staff.

At a Meeting of the Commissioners on Monday of last week, it was reported that the Sub-Committee which had been appointed to consider what advances of salary or additional bonuses should be granted in the clerical departments [see "Journal," June 5, p. 439] had recommended that the present war bonuses paid to the permanent members of the clerical staff in the Engineer's Department and to the permanent members of the clerical and collecting staffs in the Treasurer's Department be increased as follows: Males to £20 16s. per annum (8s. per week), females to £10 8s. per annum (4s. per week), and apprentices to £6 10s. per annum (2s. 6d. per week); the increased bonuses to run from May 15, 1917, during the war, and thereafter at the Commissioners' pleasure. They also recommended that three members of the Engineer's Department should receive advances of salary of £50, £50, and £25 respectively, and two members of the Treasurer's staff of £25 each. The suggestions as to bonuses were agreed to by the parent Committees; but they amended the recommendations as to increases of salary to £25, £25, £20, £20, and £20. The Commissioners unanimously approved the amended recommendations. They also authorized the Engineer to give, as from April 1 last, to the employees in the Engineering and Foundry Departments the same war bonus as was awarded by the Committee of Production to the members of the Federated Societies.

Councillor Lindsay explained that the Works Committee, at a meeting that day, had considered a letter from the Consulting Engineer (Mr. W. R. Herring) regarding the retort men [*see* "Journal," May 8, p. 252]. Mr. Herring recommended that, as a war task, and for the period of the war only, the following offers should be made: (1) Each gang of three men to operate twelve more retorts, and receive therefor an increase in pay of 6s. 8d. per week; or (2) each gang of three men to operate eight more retorts, and receive 4s. 6d. per week additional wages. Alternatively, one of these proposals might be accepted as a war task during the six winter months only, when there was a difficulty in obtaining the full number of men required. The suggestion was agreed to.

The Commissioners were informed by the Clerk that the question of the rental clerks' salaries and the wages of the gas-fitters would not form a part of the forthcoming arbitration proceedings. The former had been dealt with, and the latter were paid the standard rate of wages, less ½d. per hour in respect of special benefits. If the retort men accepted the proposal now made, they also would be taken out of the arbitration inquiry.

Sale of Gas, &c.

The Treasurer (Mr. A. Canning Williams) reported that the quantity of gas sold during the spring term was 498,854,100 c.ft., value £82,549—a decrease of 15,814,900 c.ft. (3·07 p.ct.) in quantity, and of £2182 in value. The figures for the year ended May 15 were as follows: Quantity of gas sold, 1,874,114,100 c.ft., value £309,814—a decrease in quantity of 75,299,900 c.ft. (3·86 p.ct.), and an increase in value of £12,645. The sale, though showing a falling-off compared with the previous year, was slightly in excess of the quantity estimated last September, which was within 3,000,000 c.ft. of the actual figure. The total amount of cash received during the year was £450,910.

BELFAST GAS-WORKS REPORT AND ACCOUNTS.

The report of the Belfast Corporation Gas Committee, for the year ended March 31, was presented to the Borough Council yesterday (Monday). It showed that the gross profit on the manufacture and sale of gas and residuals is £38,696, being a decrease of £45,305 compared with last year. Adding the rents received from property purchased for gas-works extension (£310), interest received from the bank (£142), and the profit on the working of the stove department (£1125), there is a total gross income of £40,273. From this have to be deducted dividend and interest charges, leaving a net profit of £16,713, which is a decrease of £45,715 compared with last year's net profit. Adding the balance forward from last year of £29,246 gives a total at the credit of profit and loss of £45,959. From this there are deducted the following items: Amount carried to sinking fund, £9674; sinking fund and interest for purchase of old abattoir site, £1233; amount carried to reserve for insurance of works, £1600; amount carried to the contingent renewal fund, £3000—leaving a balance of £30,452, out of which there have been contributed for public purposes the following amounts: Finance Committee, in aid of the rates, £5000; and dividends and sinking fund on the new City Hall stock, £11,371—leaving a balance to be carried forward to the credit of the profit and loss account of £14,081.

Alderman James Craig, J.P., in presenting the accounts, said that the decrease in the gross profit, as compared with the previous year, was £45,305. When submitting the last annual report, he pointed out that the prospects for the year on which they were then entering were not at all bright. Unfortunately, this proved to be correct; and as the months passed, expenses rose so rapidly that the Committee were compelled to increase the price of gas as from April 1 last to 2s. 4d. per 1000 c.ft. net. The reason for this would be apparent when he said that coal alone cost £75,484 more than in the previous year; while other increases for oil, taxes, war bonus, and half-pay to men in the army and navy raised this amount to £104,492. Against this, the extra revenue from the sale of gas, coke, and other residuals realized £59,187, making the decrease £45,305. In spite of these extra charges, they had been able to keep the price of gas lower than in the majority of cities in the United Kingdom. It should be remembered that gas cost 2s. 3d. per 1000 c.ft. in 1904, and that to-day, under existing abnormal conditions, it was only 2s. 4d. net, although the price of coal had more than doubled in the meantime. They had now bought the bulk of the coal that they required for the present year, and had been able to secure it at about the same price as under the last contracts. The supply of gas oil, however, was altogether different; the rate of freight being eleven times higher than in normal conditions. It was, therefore, estimated that their supplies of oil this year would cost at least £15,000 more. Other extra expenses would be: Wages, £6000; renewing retorts, £3000; and sundry materials, £5000, *plus* an estimated loss from residual products of £8000, making a total of £37,000. It was calculated, however, that the additional revenue to be derived from the recent increase in the price of gas would about balance this amount. The contractors had not yet been able to finish the last section of the vertical retort installation, owing to difficulties in transport of materials; but it was hoped that the work would be completed within the next two months. They were paying the Finance Committee £5000 in aid of the rates, as promised last year, and also providing £11,371 to meet the sinking fund and dividends on the City Hall stock. The balance carried forward to the credit of the profit and loss account would be £14,081. It was satisfactory to note that the output of gas showed an increase of 72 million c.ft. No doubt this would have been much larger had the lighting hours not been reduced by the Summer Time Act. He wished to take the opportunity of thanking the officials and the employees of the department for the attention and interest they had displayed during the year; and he had no doubt they would continue to work harmoniously together for the good of the undertaking.

In his report, the Engineer and Manager (Mr. J. D. Smith) said the decrease in the gross profit was entirely attributable to the enormous increase in the cost of all materials required in the business. The gas sold during the year through ordinary meters showed an increase of 48 million c.ft., and through prepayment meters 24 million c ft.—a total of 72 million c.ft.—the increased revenue amounting to £23,860. Coke showed an increase of £24,766, coal tar of £1838, and ammoniacal liquor of £3301. On the other hand, the increased costs were very heavy. The principal item under this head was coal, which cost £75,484 more than in the previous year. The main cause for this arose from freight, which was now three times what it was before the war. Fortunately, the action of the Government in regulating prices prevented the collieries from raising rates to the same extent; otherwise the position would have been desperate. Even as it was, great difficulty was experienced in getting adequate supplies; and it was only by constant pressure on contractors that they were able to keep going. The outlook for the coming winter was anything but bright; but with the help of good stocks which he was accumulating, he hoped to pull through. Gas oil during the past year cost £1357 over the preceding twelve months. Arrangements had now been made by which it was hoped to obtain the balance of the contract before the winter set in; and, if so, they should have sufficient to carry them on till the end of the financial year. This oil, however, would only be obtained at very heavy cost. Other increases in expenditure included rents and taxes £12,245, war bonus £2841, repairs and maintenance of plant £1412, coke and oil for water-gas plant £3868, and wages, fuel, and repairs of water-gas plant £3304. The demand for gas appliances of all kinds was very large, and was likely to grow rapidly. The citizens were coming to realize that for convenience and economy gas was the best medium for lighting, heating, or power purposes.

The working statement accompanying the accounts shows that the quantity of coal gas made was 1,765,230,000 c.ft., and of water gas 877,362,000 c.ft.; the total being 71,060,000 c ft., or 2·76 p.ct., more than in the preceding year. The make of gas per ton of coal was 13,326 c.ft., per ton of oil used 140,518 c.ft., and per ton of coke used 54,248 c.ft. The oil used per 1000 c.ft. of gas figures at 1·859 gallons, and the unaccounted-for gas at 5·49 p.ct.

LEEDS GAS UNDERTAKING.

The report submitted last week to the Leeds Gas Committee by Mr. W. B. Leech (the Engineer) shows a total revenue for the past twelve months of £490,652. The total expenditure was £356,328; leaving a gross profit of £134,324, as compared with the previous year's gross profit of £126,300. The payment of £11,330 in income-tax, £3965 in war allowances, £47,545 interest, £49,723 to redemption fund, and £20,585 contributions to capital, leaves a surplus of £1176. The gas revenue has been £334,559, as against £309,948; and revenue from residuals has increased from £115,411 to £141,828. The market for residuals, particularly coke, has been favourable. The cost of coal increased by £35,299, and the war bonus paid by £3300, being now £6521. Carbonizing wages increased from £23,895 to £25,789.

The sale of gas increased from 2,610,212,000 to 2,738,694,000 c.ft. or an increase of 4·9 p.ct., despite the large decrease in consumption for lighting purposes as compared with the last pre-war year. The war has created a great development at the Leeds works in the gas-furnace branch; the consumption for this purpose having increased 181·3 p ct. The total capital expenditure to the end of March was £2,105,408; the amount expended on capital account during the past year having been £61,429. The net debt on capital account has been reduced by £8899 during the year, and now stands at £1,097,842, having been reduced by £175,682 since 1910. The amount of coal carbonized during the past year, including the coal equivalent of oil used in the manufacture of carburetted water gas, was 263,981 tons—an increase of 9835 tons, or 3·8 p.ct. The gas sold per ton of coal had increased from 10,270 c.ft. to 10,374 c.ft. The total length of mains of the undertaking is 1015 miles; 2508 yards having been added last year. The number of meters fixed was 118,273—a decrease of 159 on the previous year. The gas-cookers in use in the city was 13,239—an increase of 1808; cookers with prepayment meters, 10,389—a decrease of 255; grillers, 19,492—an increase of 107; gas-fires, 4693—an increase of 1884; radiators, 1669—an increase of 196; other appliances, 174—an increase of 15.

Mr. Leech reported that the works had been maintained in efficiency out of revenue during the year, and considerable progress had been made with the scheme for the reconstruction of the Meadow Lane works, where completion had been reached in the vertical retorts, the pump-house, turbo-exhauster, purifiers, and oxide handling plant. At New Wortley, the telpher plant for coke handling is now in use.

SOUTH BARRACAS GAS COMPANY.

The Twenty-Seventh Ordinary General Meeting of the South Barracas (Buenos Ayres) Gas and Coke Company, Ltd., was held last Thursday, at the London Offices, No. 1, East India Avenue, Leadenhall Street, E.C.—Mr. J. C. IM THURN (the Chairman) presiding.

The SECRETARY (Mr. W. Upton) read the notice convening the meeting, and the report of the Auditors.

The CHAIRMAN, referring to the accounts for the twelve months ended Dec. 31 last, said the result of the year's working had been a debit balance of £3267 in South Barracas—the first time this had occurred. The addition in London of interest on loans and advances (£6443) brought the total debit this year up to £9710. The accounts did not call for much comment. Economy in all directions had been carried to the extreme limit. Manufacture had cost £7737 more, due entirely to the increased cost of gas-making materials. London expenses were less; but interest on loans and advances showed a small increase of £444. On the other side, sales of gas exhibited a slight decrease; but residuals having sold at high prices, there had been a gain of £3573. A large part of this was due to the ability of the Manager (Mr. R. B. Brown) in devising means for using wood and charcoal in the carburetted water-gas plant, and so saving the total make of coke for sale. Further coal had now become impossible to obtain; and during the current month their supplies would become exhausted. The Board had, however, every hope that the Manager would be able to carry on by making use of wood and oil of various kinds. A good feature, and one that spoke well for the management, was that, notwithstanding general financial troubles on the other side, the bad debts had been reduced to £438, as against £1083 for the previous year. The Manager reported that his new methods of using wood in place of coal had considerably improved the financial position; so that the worst of the crisis was in all probability now past. He further considered that the proprietors could look to the future with more confidence than it had been possible to do for some time. During the past year, many attempts had been made to induce the Municipalities in their district to allow a temporary increase in the price of gas to compensate for the very high price of coal and oil; but, unfortunately, these efforts had not met with any success. Gas sales had shown a small increase, which was most encouraging; but while the war continued, they had to strain every effort to keep the business together. The property was a good one, and on a return to normal conditions should show progress and expansion. Their relations with the Municipalities remained good, as usual, though a sum was owing for public lighting services which it was extremely difficult to collect. Were it possible to obtain payment of these accounts, the financial position would be considerably eased; but, as it was, the Company were in great difficulties for funds to carry on. The interest on loans at the bank for 1916 was provided by the Directors; but the shareholders must now come to the help of the Board, and provide sufficient money to enable the Company to be carried on. A scheme was being considered whereby a portion of the present first mortgage debentures might be made available on terms and offered to the shareholders. It was much to be hoped that the position the undertaking had been placed in (due to the war) would be understood, and that a good measure of support would be given by all towards saving the Company. The Directors had waited now for nearly three years for a favourable moment; but the matter was one that could no longer be postponed.

The report and accounts were adopted.

DIRECTIONS AS TO THE SALE OF COAL.

Schedule of Export Prices.

The Controller of Coal Mines (Mr. Guy Calthrop) has issued a code of directions as to the sale of coal, with a view to dealing with fluctuations in colliery prices which have recently occurred in certain districts owing to abnormal market conditions, and to preserving the necessary regularity in the distribution of coal. The directions mainly affect the prices of coal for export and bunker purposes, for which a definite schedule of prices has been drawn up; but they also provide, as will be seen, that the pit prices of coal for home consumption shall remain at the *maxima* prescribed by the Price of Coal (Limitation) Act.

I.—SALE OF COAL FOR CONSUMPTION IN THE UNITED KINGDOM.

No coal shall be sold by collieries for consumption in the United Kingdom except at the maximum prices under the Price of Coal (Limitation) Act.

II.—SALE OF COAL FOR SHIPMENT TO FRANCE AND ITALY (AND POSSESSIONS AND PROTECTORATES).

The prices specified in the schedule shall be charged as fixed prices in the case of all sales of coal after June 28, 1917, for shipment to France and Italy, including coal for the manufacture in the United Kingdom of coke-oven coke or of patent fuel for shipment to these destinations. These prices are net f.o.b. at the nearest shipping ports to the collieries, and for cash within seven days after shipment. If shipped at a more distant port, the extra railway and shipping dues may be charged. The prices are net; and no discount, rebate, or allowance of any kind, either in money, quantity, credit, or otherwise, is to be given to any buyer. The quantities to be paid for shall be the quantities certified by the colliery, railway, or harbour authority, as customary. Exporters, whether coalowners or merchants, shall charge in addition remuneration at the rate prescribed below.

Clauses follow dealing with exporters' services and applications for export licences.

III. SALE OF COAL FOR SHIPMENT TO DESTINATIONS OUTSIDE THE UNITED KINGDOM OTHER THAN TO FRANCE AND ITALY (INCLUDING COAL FOR MANUFACTURE IN UNITED KINGDOM OF COKE-OVEN COKE OR OF PATENT FUEL FOR SHIPMENT TO DESTINATIONS IN QUESTION), OR FOR USE AS BUNKERS (INCLUDNG COAL DISPATCHED TO COALING STATIONS).

In no case shall coal be sold for these purposes at prices less than the fixed prices applicable in the case of sales to France and Italy, set out in the schedule. These prices are net f.o.b. at the nearest shipping ports to the collieries, and for cash within seven days after shipment. If shipped at a more distant port, the extra railway and shipping dues may be charged. The prices are net; and no discount, rebate, or allowance of any kind, either in money, quantity, credit, or otherwise, is to be given to any buyer. The quantities to be paid for shall be the quantities certified by the colliery, railway, or harbour authority, as customary. Exporters, whether coalowners or merchants, shall charge in addition remuneration as prescribed below.

Clauses again follow dealing with exporters' services and applications for export licences.

IV.—GENERAL PROVISIONS.

(1) On every sale of coal by a colliery after June 28, the colliery shall specify whether the coal is sold for consumption in the United Kingdom, shipment to France or Italy, shipment to other destinations, or as bunkers, including coal dispatched to coaling stations, or use in the manufacture of coke-oven coke or patent fuel for shipment to France or Italy, or to other destinations outside the United Kingdom, as the case may be.

(2) On every purchase of coal for re-sale, the purchaser shall undertake that the coal will be used for the purpose specified by the colliery; and, in the case of sales for shipment, that all the conditions applicable to the sale contained in these directions will be complied with.

(3) On proof of breach of these directions by any person or firm, in addition to the penalties prescribed by section 1 of the Trading with the Enemy and Export of Prohibited Goods Act, 1916, existing export licences may be revoked, and all further licences refused to such person or firm for the period of the war, or such other period as may be determined by the War Trade Department.

(4) The following contracts are not to be interfered with by these directions:

(*a*) All contracts entered into before May 1, 1917.
(*b*) Existing contracts for purchase of coal or coke-oven coke which has already been sold or re-sold—
(i) to consumers in the United Kingdom;
(ii) to purchasers abroad;
(iii) to shipowners for bunkering their own steamers (including holders of steamers on time charter);
(iv) to manufacturers of coke-oven coke and patent fuel.

(5) These directions will not apply to any coal purchased by the Admiralty.

SCHEDULE OF PRICES FOR EXPORT.

The following figures are taken from the schedule of prices referred to in the directions:

Monmouthshire and South Wales.

	Price Per Ton. s.	d.
BITUMINOUS.		
Best households	33	0
Good households	30	9
No. 3 Rhondda large	30	9
Smalls	26	0
No. 2 Rhondda large	27	0
Through	25	0
No. 2 Smalls	20	0
BITUMINOUS (SWANSEA).		
Through and through	27	0
Smalls	24	0
COKE-OVEN COKE	47	6

Northumberland.

GAS.		
Class I. Mickley	26	6
Class II. All other gas coals from Northumberland	23	6
COKE-OVEN COKE	42	6

Durham.

GAS.		
Class I. Easington, Stella, Thornley, Londonderry, Wearmouth	26	6
Class II. Boldon, Hetton, Holmside, New Pelton, Ryhope	25	0
Class III. Brandon, Burnhope, West Leverson Consett, Deafhill, Deans Primrose, East Pontop, Felling, Horden, Lambton, Pelaw Main, Pelton, Priestmans, Ravensworth, Sherburn, South Derwent, South Pelaw, Usworth, Wallsend and Hebburn, Washington, West Pelaw Main (and other coals not specified)	23	6
COKE-OVEN COKE	42	6

Notts, Derby, and Yorks.

GAS.		
Screened	26	0
Nuts	25	6
Unscreened	25	0

Lancashire.

GAS.		
Screened	26	0
Unscreened	25	0

Scotland.

COKE-OVEN COKE	40	0

HEYWOOD CORPORATION GAS-WORKS.

Mr. W. Whatmough, the Engineer and Manager of the Heywood Corporation Gas-Works, in his annual report, states that the gross revenue for the year ended March 31 amounted to £26,627, and the expenditure (less interest and sinking fund) to £21,140, leaving a gross profit of £5487, or a decrease of £643 compared with the previous year. After payment of £5769 for interest and sinking fund, there is a net loss of £282.

The receipts for gas sold for all purposes amounted to £19,685, compared with £19,553. The sum received for public lighting for the year was only £49, compared with £505 prior to the war. Receipts for residuals and spent oxide showed an increase of £1125. The expenditure on manufacture of gas was £14,242, compared with £12,988. Coal cost £929 more; but as the quantity carbonized was only 11,110 tons, as against 11,769 tons the previous year, the average increased cost per ton of 2s. 8·26d. represents a total of £1492. Compared with five years ago, the actual cost per ton of coal carbonized was 19s. 9·43d., against 13s. 5·24d., or an increase of 6s. 4·19d. per ton, representing a total increased charge for coal only of £3527. This amount would have been considerably more but for the saving of 1277 tons of coal by the adoption of the new system of carbonization. Purifying materials again show a balance to credit of £134; and carbonizing wages also show a saving of £218, although the rate of pay has been increased, due to the vertical retorts being in operation for a longer period than the previous year. This further resulted in an increased make per ton of 264 c.ft., thereby saving 244 tons of coal. Rents, rates, and taxes amount to the large sum of £4071. The increased charge for the past year compared with five years ago is £251 for rates and £1505 for income-tax, or a total of £1756. The increased charge for interest and sinking fund for the same period is £250, or a grand total of £2006 additional charge against revenue to meet, in addition to the increased cost of coal, other materials, and wages. The cost this last year for rates and taxes, interest, and sinking fund is 1s. 7·08d. per 1000 c.ft. of gas sold.

The gas made per ton of coal carbonized was 12,297 c.ft., as against 12,033 c.ft. for the previous year. The quantity of oil used was 80 gallons, against 776 gallons. The quantity of gas manufactured amounted to 136,626,000 c.ft., or a decrease of 4,987,000 c.ft.; and the quantity sold, as registered by the consumers' meters, was 123,792,942 c.ft., or a decrease of 4,574,096 c.ft. The total decrease in gas sold compared with the year ended March 31, 1914 (pre-war), is 11,067,000 c.ft., or 8·08 p.ct. The unaccounted-for gas was 10,533,108 c.ft., or 7·70 p.ct.

Concluding, Mr. Whatmough says: Considering the increased charge against revenue, the small loss of £282 for the year will, no doubt, be regarded by the Committee as satisfactory; and I would suggest that the deficit be paid from the reserve fund. The outlook for the coming year is not encouraging; and although there is every indication that the deficit next year will be considerably more than in the present one, I do not recommend a further increase in the price of gas at present.

YEAR'S RESULTS AT BLACKBURN.

The report on the results relating to the Blackburn Corporation gas undertaking for the past financial year is signed by the Chief Clerk (Mr. T. Hannibal) and Works Superintendent (Mr. C. W. Ward).

It is stated that there is a gross profit on the year's working of £28,082; and after meeting interest and sinking fund charges, amounting to £32,792, and extensions (new plant) charged to revenue account for the financial year, amounting to £3734, there is a net loss on the working of £4639.

The average weekly number of employees has been 224, compared with 210 during the previous year; and the total wages bill has been £22,363, against £19,411 for the previous year. The average weekly wage has been £1 18s. 5d.; while the previous year it was £1 15s. 6d. During the year the rates of wages have been increased, costing the department £2200 per annum.

The consumption of gas during the year was 719,293,000 c.ft., as compared with 768,060,000 c.ft. during the previous year, being a decrease of 48,767,000 c.ft., or 6·78 p.ct. The consumption per ordinary meters was 389,487,400 c.ft., or 54·15 p.ct.; slot meters, 273,881,500 c.ft., or 38·07 p.ct.; public lighting, 3,261,800 c.ft., or ·45 p.ct. Unaccounted-for gas amounted to 44,400,100 c.ft., or 6·18 p.ct. The number of ordinary meters was 13,678, with an average consumption of 28,474 c.ft.; automatic meters, 23,227, with an average consumption of 11,792 c.ft. The gas sold at special rates for industrial purposes amounted to 40,523,000 c.ft., as compared with 34,259,000 c.ft. in the previous year.

There are now 2735 gas-lamps in the area of supply; but, owing to the restricted lighting, only 527 are in use. There are 77 employees of the department serving with His Majesty's forces; and the weekly payments to their dependants amount to £29. The allowances paid during the year came to £1286, as compared with £1210 for the previous financial year.

The loss of £4639 on the year's working is more than accounted for by the following increased costs: Coal and oil, £5549; income-tax, £4000; extensions (new plant), £3734; wages, £2952; maintenance of works, £2282. Against these figures, the cost of purification has been reduced to £422, as compared with £2245 last year; while residual products have yielded £1500 more, and sales of gas £3000 more. The condition of the carbonizing plant is still a source of considerable anxiety, and is likely to remain so until the proposed new plant is installed. It is pointed out that all extensions and alterations form part of the general scheme for the reorganization of the undertaking, as formulated by the late Mr. Morton Fyffe. The greater part of this scheme—vertical retorts, &c.—is being held-up by the refusal of the Local Government Board to sanction the necessary loan.

SPENBOROUGH GAS UNDERTAKING.

The figures for the year ended March 31, in connection with the Spenborough District Council's gas undertaking, were presented in the course of a tour of inspection of the works by the combined Gas Committee of the townships of Cleckheaton, Liversedge, and Gomersal, which go to make Spenborough, under the recent amalgamation.

The Chairman of the Committee (Mr. J. Hirst) outlined the history of the undertaking, and mentioned that the concern went back as far as 1837, when there was a small Company at Rawfolds, with a capital of £3500 in £10 shares. The works became too small, after some years; and new ones were built at Marsh. These were the works now called the old works. The undertaking was purchased by the Cleckheaton Local Board in 1870, for £23,562; and extensions and repairs at an early date after acquisition cost £30,000. Since then the needs had again increased, and the works at Moorend, the latest part of the undertaking, were constructed and completed in 1914. Mr. Hirst said the greatest credit was due to Mr. A. L. Jennings (the Engineer and Manager), for the manner in which he had made the works a success during the past twelve months; and the Gas Committee had been greatly assisted by the Council generally and by the staff and employees. They had all worked harmoniously toward the one end. During the year, the consumption of coal had been reduced 867 tons; but the output of gas had increased by 361,000 c.ft.—the increased make of gas per ton averaging 851 c.ft. Although the rates of pay had advanced, £635 less had been paid in wages. It would be agreed that they had a creditable plant, and a most satisfactory year.

Mr. W. E. Veasey (the Accountant to the Council) said in 1870 the make of gas was only about 30,000,000 c.ft.; while last year it was 144,362,000 c.ft. The new works were designed to produce 1,000,000 feet per day, though this would require the putting down of a fifth retort setting, which was not considered necessary at first, The Council's Order of 1913 allowed the raising of £50,000 for the new undertaking; but the provision of a holder and of sulphate of ammonia plant having been postponed for the time being, the actual sum sanctioned to be borrowed was £39,755, in addition to which £3438 had to be provided out of revenue in respect of superseded works. So the total must be taken at £43,193, of which, up to the year-end, £42,348 had been expended. By the various Orders the aggregate capital authorized was £125,000, of which £93,435 had been actually raised up to date. The present debt was £48,239. In 1870, the price of gas was 4s. 6d. per 1000 c.ft.; while now it was 3s. for domestic use, with a discount of 10 p.ct., and 2s. 8d. for industrial use, less a discount of 15 p.ct. The actual gas sold last year was 133,830,000 c.ft., compared with 86,541,000 c.ft. in 1901, and the estimated net profit was £4077, a percentage on the capital of 8·45, as against a net profit in 1901 of £743, or a percentage of 2·3. The Committee had decided to set aside £500 yearly for renewal of retorts.

After giving an outline of the nature of the new works, in which gas making began September, 1914, Mr. Jennings said the only drawback was that additional retorts were already desirable. In the old hand-fired works 22 men were employed in winter; whereas now, with mechanical charging, only six were required in the retort-house. After describing features of the plant, fully detailed in the "Journal" on the occasion of a visit to the works by the Yorkshire Junior Gas Association, he expressed appreciation of the loyalty of his staff and the good time-keeping of the men.

The visitors then inspected the new breeze washer, which was designed by Mr. Jennings, and built by Messrs. Waller and Son. It is capable of dealing with about 30 cwt. of breeze per hour. A revolving cylindrical screen, set at a slight downward slope, is fed from a small hopper filled by hand. From the upper half of the cylinder the dust falls through small perforations into a heap below, while the larger particles for washing fall direct into a water-trough through openings of sufficient size in the lower half. The pieces large enough to be put to other uses are shot out dry at the cylinder end. In the water-trough the coke particles and impurities separate by gravity; and while the coke is ejected at one end by a device which at the same time effects the needful agitation in the trough, foreign matter is recovered from the bottom by the buckets of a small continuous conveyor, and deposited in a separate heap on the ground. The power is secured by a shaft from the works engine-house; and the water used in washing is clarified and returned for use again. The dust and the eliminated impurities are burnt under the works boilers with forced draught, and raise all necessary steam for works purposes.

After refreshments had been enjoyed at the offices, appreciative speeches were made by the visitors. Mr. J. H. Collier (the Chairman of the Council) expressed the hope that when the war was over they could proceed to obtain powers to buy the Gomersal gas undertaking, and supply Gomersal as well as the districts now served. The other part of the Council's district—Liversedge—raised a bigger question. Mr. Collier paid a tribute to Mr. Jennings and his washing plant.

WEST BROMWICH GAS-WORKS REPORT.

Price of Gas for Power and Industrial Purposes.

In his third annual report to the West Bromwich Gas Committee, dealing with the year ended March 31, Mr. W. H. Johns, the Engineer and Manager, under the heading of maintenance, sets forth the work carried out, and says two new purifiers with connections have been installed, at a cost of £2130, which amount has been charged to revenue. The increased cost of labour and materials due to the war, and the great difficulty in obtaining the various kinds of material necessary to carry on the works, have not diminished during the year. The rateable value of the gas-works was increased by £1200, when reassessed in August last. This item and an increase in income-tax have appreciably affected the profits on the year's working.

The quantity of coal carbonized was 33,790 tons, as compared with

32,032 tons in the previous year; the quantity of coal gas manufactured per ton of coal carbonized being 12,257 c.ft., against 12,201 c.ft. The cost of coal has again advanced; and the price of gas oil is now rendering the manufacture of carburetted water gas prohibitive. This plant has only been worked at times when the shortage of available labour for gasmaking rendered it imperative. At present there is, approximately, three months' supply of gas oil in reserve; and Mr. Johns reminds the Committee that this was bought at the pre-war price. Since the date of purchase the price has increased 400 p.ct.; and, moreover, supplies are now practically cut off. Anxious days and nights were experienced last winter, owing to insufficient deliveries of coal and lack of the labour necessary for handling coal from stock. The quality of the coal has not been so good as hitherto; but it has been necessary to accept what was offered. The cost of manufacturing carburetted water gas was 20·69d. per 1000 c.ft., as compared with 15·96d. for the previous year. The quantity of carburetted water gas made was 3·23 p.ct. of the total make. The increased cost of manufacture was due chiefly to the higher cost of gas oil. Spot lots were bought, and used to prevent depletion of stocks at the works.

The following is a summary of the principal working results obtained during the year, as compared with the previous year's working:

	1916–1917. C.Ft.	1915–1916. C.Ft.	Increase.
Gas made	427,997,295	423,797,000	—
Gas sold	399,185,629	395,283,868	1·1 p.ct.
Gas used on works	6,470,000	5,831,000	—

Manufacturing Costs.

		Per 1000 C.Ft. Sold.			Per 1000 C.Ft. Sold.
Coal for carbonizing (including oil, &c.)	£37,392	1s. 10·48d.		£32,056	1s. 7·50d.
Wages at gas-works	£4,118	2·48d.		£3,368	2·06d.
Repairs and Maintenance of works and plant	£7,328	4·40d.		£6,206	3·77d.

Purification.

Wages have increased from £186 to £267; but a profit has been made on purification, owing to the high prices which have been realized on spent oxide of iron.

The output of gas for the first nine months of the year showed a considerable reduction on the previous year—namely, 10,310,749 c.ft.; but in the last quarter of the year this was made up, and on the year an increase of 1·1 p.ct. was delivered.

The gross profit for the year amounted to £13,072, as compared with £13,183 last year. Interest and sinking fund charges came to £10,343, as against £10,338; and the net profit was £3011, against £2845.

As to residuals, the value of coke increased considerably during the year; and the quantity available for sale was again more, having risen from 8·6 to 8·92 cwt. per ton of coal carbonized. The revenue from coke sales also increased—a larger tonnage being available for sale, owing to a smaller amount having been used for the manufacture of carburetted water gas. At the moment, it is unprofitable to extract cyanogen; and the process has therefore been discarded.

Public lighting was discontinued until Feb. 14 last, when 22 high-pressure lamps were lighted in the High Street. During the summer months they will not be used. The average consumption of gas per meter was: Ordinary, 49,332 c.ft.; prepayment, 11,631 c.ft. The unaccounted-for gas amounted to 5·19 p.ct., compared with 5·2 p.ct. in the previous year. The power and industrial load is an ever-increasing one, and now amounts to 35 p.ct. of the total output. The increased quantity taken for this purpose during the year was 34,000,000 c ft. The higher cost of materials and wages having increased the cost of manufacture of gas, this will necessitate some increase in the charges for gas, as otherwise a loss will be incurred.

With regard to the price of gas for motive power and industrial purposes, the following joint report by the Borough Treasurer (Mr. H. Kirk) and Mr. Johns has been submitted to the Gas Committee, who have accepted the recommendations contained therein, and are advising consumers of the increased price, to date from the end of June. Ordinary and prepayment consumers are not affected.

In view of the increasing expenditure in connection with the manufacture of gas, it becomes necessary for the Committee to consider whether the price of gas supplied for motive power and manufacturing purposes should be further increased.

It is estimated that, during the financial year ending March 31, 1918, the expenditure of the department will amount to £5000 (approximately) more than the expenditure during the past year, as shown by the following details:

Engineer's Estimate.	Increase.
Coal	£2000
General stores and materials	1500
Wages	1716
Part cost of motor lorry	500
Repairs to turntable	130
	£5846
Less:	
Additional income from coke sales	846
	£5000

Based on total output of 400 million c.ft. of gas sold for all purposes last year, this amount is equivalent to 3d. per 1000 c.ft.

During the past year the total cost, after deducting the income from residual products, was equal to 1s. 10·43d. per 1000 c.ft.; and after charging interest and sinking fund instalments, the inclusive cost was 2s. 4·48d. The average price obtained for gas sold for motive power and manufacturing was 1s. 10·46d.; while the average price obtained for all gas sold was 2s. 7·46d.

The present scale of charges is as follows:

Lighting.

Per Quarter.	Per 1000 c.ft.	Less.
Less than 25,000 c.ft.	3s. 0d.	5 p.ct.
25,000 to 50,000 c.ft.	2s. 10d.	,,
50,000 to 500,000 c.ft.	2s. 8d.	,,
500,000 and upwards	2s. 7d.	,,
Prepayment supply	3s. 6d.	Net.

Motive Power and Manufacturing.

Per Quarter.	Per 1000 c.ft.	Less.
Less than 200,000 c.ft.	2s. 1d.	5 p.ct.
200,000 c.ft. and upwards	1s. 10d.	,,

The quantity of gas sold for motive power and manufacturing in the past year was 142 million c.ft., of which approximately—

20,000,000 c.ft. was charged at 2s. 1d. per 1000 c.ft.
And 122,000,000 c.ft. ,, ,, ,, 1s. 10d. ,, ,,

It will therefore appear that the greater part of this supply is taken by consumers who use more than 200,000 c.ft. per quarter; and the question arises as to whether the incidence of the scale should not be varied. If the scale were altered as follows:

Per Quarter.	Per 1000 c.ft.	Less.
Less than 1,000,000 c.ft.	2s. 4d.	5 p.ct.
Over 1,000,000 c.ft.	2s. 3d.	,,

the estimated additional income which would accrue on the basis of last year's sales would be £3000, and the increases payable by the various consumers would be:

Per Quarter.	Per 1000 c.ft.	Increase.
Consumers of under 200,000 c.ft., from	2s. 1d. to 2s. 4d.	3d.
,, 200,000 and under 1,000,000 c.ft.,	1s. 10d. to 2s. 4d.	6d.
,, 1,000,000 c.ft. and over ,,	1s. 10d. to 2s. 3d.	5d.

The effect of this alteration would be:

Estimated increase in expenditure	£5000
,, ,, income	3000
,, decrease in net surplus	£2000

The net profit for the year 1916-17 was £3011.

COVENTRY CORPORATION GAS UNDERTAKING.

Good progress (as shown by the encouraging financial results) continues to be made by the Coventry Corporation gas undertaking. Another highly successful year's trading, notwithstanding abnormal conditions, has again been experienced.

The accounts to March 31 show an available surplus of £27,190, against £20,557 the previous year. From the figures submitted by the Gas Committee to the City Council at the last meeting, it appears that the total borrowing powers since the acquisition of the undertaking amount (with nominal additions) to £479,805, of which £51,058 has been repaid out of the sinking fund, leaving the present liabilities £428,747. Against these liabilities there are reserve and sinking funds, invested or waiting investment, amounting to £112,714—leaving a balance of liability of £316,032. During the year, £1942 has been expended on capital account. The total capital expenditure to March 31 last was £488,228; but a sum of £67,000 has been set aside towards meeting the loss of capital consequent on the abandonment of plant at the old works, thus reducing the net total of capital expenditure to £421,288. The revenue for the period from all sources, including the sale of gas and residual products, and the rental of meters, fittings, &c., amounted to £280,348, compared with £215,798 the previous year. The working expenses were £224,678; leaving a gross profit for the year of £55,670, as compared with a gross profit of £48,938 the previous year. Noticeable features were the increased revenue from the sale of gas, amounting to £21,763, and the abnormal advance in the value of residuals, which accounts for an increase of £39,926. From the gross profit for the year, £55,670 has to be deducted for capital and other charges, amounting to £33,818, so that the net profit is £21,852. From this has further to be taken £8219 allocated to new stoves, meters, &c., leaving a balance of £13,632. The sum of £13,557 was brought forward from last year, which makes the total surplus available £27,190. The reserve fund amounts to £16,082, of which £15,846 is invested in War Loan, and £235 is on deposit. The Committee have made the following recommendations to the Council in regard to the amount available for distribution: That £5000 be paid over to the general district fund in aid of the rates, and that the balance of £22,190 be carried forward to the next account.

In submitting the Committee's report to the Council, Mr. T. Quinney drew attention to the fact that the year had been one of unprecedented difficulties. There had been the problem of labour, the difficulty in regard to coal and oil, and in many ways the undertaking had had to go through a considerable amount of trouble. Yet in spite of this the department was able to point to a successful year. The demand for gas had increased year by year. When the gas-works were removed from Coventry to Foleshill, the output was 2,000,000 c.ft. per day; and the possibilities of the new works are calculated to serve the city for twenty years ahead. So great had been the increase in the consumption of gas that within nine years of the removal the amount had gone up something like 111 p.ct. The gas now supplied was 4¾ million cubic feet per day. The record day was Dec. 20 last, when the gas made was 6,390,000 c.ft. In one week the amount of gas produced was no less than 5,740,000 c.ft. per day. Congratulations were offered to the Manager, Mr. Fletcher W. Stevenson, the staff, and the employees on the successful year's work.

The Council adopted the report.

The Committee also submitted a recommendation that an additional carburetted water-gas plant, of a capacity of 2,000,000 c.ft., be installed at the estimated cost of £15,750. In urging the importance of this matter, Mr. Quinney said that they were trying to meet the demand for gas for power purposes, and also to assist the ordinary consumer.

The Council approved the recommendation.

DUNFERMLINE GAS-WORKS.

Report by an Expert.

Owing to interruptions in the supply of gas and trouble experienced by consumers in obtaining an adequate pressure during last winter, the Town Council decided to appoint an expert to make inquiry and report. Mr. John Gillespie, of Glasgow, was appointed; and his report has now been received. He was asked to report on the following points: (1) On the condition and plant at the gas-works, particularly the vertical retorts. (2) As to whether such examination has revealed any defect in the plant or machinery which might account for the recent shortage, as well as the defective quality of the gas, and, if not, as to the cause of such short and defective supply. (3) As to the present capital value of the vertical retorts, and their probable life. (4) As to the productive capacity of the works at the present time, and as to whether it is sufficient to meet prospective developments in the near future. (5) As to any improvement or repairs which should be carried out on the plant and machinery. (6) As to whether there is any systematic method of measuring gas sent out under pressure. (7) As to whether it is desirable to separate the management of the productive department from that of the accounting department.

Mr. Gillespie finds the condition of the plant good, with the exception of the horizontal retorts and the newer vertical retorts. Many of the horizontals are not in good condition, because the renewals—which in the ordinary course of things would have been undertaken last summer—were not carried out, in the expectation that the additional vertical retorts then in course of construction would be completed and working. Of the vertical retorts, there are two designs. The first type, which started to work in March, 1914, seem to be in good condition, and have done good work. The second installation differs in design from the first, and in certain features the reporter considered not to be an improvement on the first. Eight retorts examined and entered after cooling-down were found to be cracked in many places, more especially towards the bottom. The rest of the plant is generally in good condition. The shortage of supply that occurred was due to several causes. The completion of the vertical retorts had, through difficulties connected with war conditions, been delayed far beyond anticipation. The labour difficulty was most serious, as it was found impossible to obtain a sufficient number of trained stokers. There was also serious delay in delivery of coal and to the necessity of using coal from stock. The principal cause of complaint as to defective quality lies in the reduced pressure at which the gas was supplied during the periods of low production, accentuated by the removal of the hydrocarbons required by the Ministry of Munitions.

Having regard to all the circumstances, Mr. Gillespie is of opinion that an error in judgment occurred with regard to the change from horizontal to vertical retorts at the date of maximum demand, and that the situation as regards labour might have been saved if an appeal to the Council for outside assistance had been made at the proper time.

The capital expenditure of the installation compares satisfactorily with that of other similar installations, notwithstanding that the work was contracted for, and carried out, in war time.

As to the productive capacity of the works, the exhausters, scrubbers, purifiers, and station meter are capable of dealing with more gas than will probably be required in 1930. The retorts, condensers, and gasholders will require extension within the next few years.

In regard to repairs necessary, immediate attention should be given to the horizontal retorts (96 in all), and the repair of the eight vertical retorts examined be proceeded with at once. The cracks in the vertical retorts can be repaired by the usual pointing in the seams. As improvements, a larger coal-store should be provided, as well as a supplementary means of raising coal, a larger steam-boiler provided, and portions of the older gasholder repaired at the earliest opportunity.

As to a means of measuring gas under pressure, an adaptation of an ordinary meter is made to suit high pressure.

The reporter is clearly of opinion that the management of the productive department should be separate from the management of the accounting department.

In a supplementary report, Mr. Gillespie adheres to his recommendation that the vertical retorts should be repaired, and that there is great urgency in this matter, having regard to next winter's requirements.

A separate report is furnished by Mr. Alexander Murdoch, of Glasgow, as to the capital expenditure the last five years. Mr. Murdoch states that the books are well and carefully kept, but that a correct system of allocation between capital and revenue has not been adopted. He advises that this allocation should be made when the accounts are passed for payment, and similarly with the wages each week.

Mr. Waddell was asked to give his observations on Mr. Gillespie's report. In his opinion, the root cause of all the troubles at the gas-works during the past winter was that of labour and the difficulty of obtaining the necessary number of men, and that this dominated the whole situation of affairs.

The Special Sub-Committee appointed to deal with the affairs at the gas-works have now made their report; and the whole matter will be dealt with at an early meeting of the Town Council.

Having in mind the probable difficulty in obtaining coal during the coming winter, the Leeds Education Authority have decided to purchase 140 gas-fires, at the price of £2 13s. 6d. each, including fixing, for the Headingley Wesleyan College, which has been taken over by them for the training of teachers.

The Coal Controller has issued instructions to the collieries in Nottinghamshire and Derbyshire referring to the distribution of supplies. The chief points are that no coal shall be allowed into Nottinghamshire and Derbyshire from any other area. Collieries are only permitted to send to certain districts; and under these conditions it is expected there may be increased supplies for London.

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ESSEX WORKS . . BIRMINGHAM.

BENZOL PLANT AT KEIGHLEY.

The benzol plant at the Keighley Corporation gas-works at Thwaites, after being at work about a fortnight, was formally visited and inspected last Friday by the Mayor and members of the Town Council, on the invitation of the Gas Committee. The leaders of the party were the Mayor (Mr. F. W. L. Butterfield), Alderman J. Harrison (the Chairman of the Gas Committee), Mr. W. Bailie (the Gas Engineer), and Mr. H. B. Holliday (the Assistant Engineer).

The visitors were conducted over the whole of the undertaking; the new benzol, sulphate of ammonia, and carbonizing plants being described in detail. The benzol plant has a productive capacity of about 90,000 gallons of crude liquor per annum. Profit, it was stated, has not been so much the prime consideration as a readiness to help in the national need; but it is not expected that the new undertaking will involve loss, and only slight alteration after the war will be required to fit the plant for the dehydration of tar for ordinary purposes. The installation is the work of the Chemical Engineering Company, of Hendon, and Messrs. Clapham Bros., Ltd., of Keighley, under Mr. Bailie's supervision. There is an oil washer, scrubber, economizer, coil-still, benzol-still, benzol condenser, and storage tanks; the total cost being about £2100.

Light refreshments followed the inspection. The Mayor, in thanking the Gas Committee, said he did not presume to know much about the history of the Thwaites works, beyond that they were opened in 1876. He hoped that so long as the war lasted the benzol plant, which promised so much success, would continue its patriotic work, and that afterwards it would prove of great commercial importance and be a remunerative investment. Alderman John Harrison remarked upon it being ten years since the Council last inspected the works—the occasion being the starting of a new conveyor. Since then there had been improvements of the greatest advantage to the town; and he believed they had now one of the best plants, if not in Great Britain, at least in Yorkshire. Alderman Harrison paid high tribute to the work of Mr. Bailie and the staff at the works, and said he could assure him that the Committee would assist him in every possible way. Their late Gas Manager (Mr. Laycock) had always urged that the funds should never be less than about £15,000; but now, unfortunately, the funds had got to the rock-bottom. He hoped that when the report of the past year's working came before the Council, they would accept the suggestion that whatever profits there were should go to the working capital fund until they got up (say) to £15,000 again. They had had a better year than they expected. They had estimated a profit of £1500; but he was glad to say it was actually considerably more. Everything seemed to have worked out advantageously. There was no doubt Mr. Bailie had the interests of the undertaking thoroughly at heart, and everything was being carried on to the best advantage.

CALCUTTA PUBLIC LIGHTING CONTRACT.

Some Points in Dispute.

Official records just to hand from the Calcutta Corporation furnish details of various matters in dispute with the Oriental Gas Company. Some of the points under discussion are indicated below.

Lighting Hours.—Certain lamps are being extinguished at 10 p.m. and 1 a.m. The Company contend that the Corporation must keep all lamps alight for at least ten hours per night; and they have submitted bills for the gas consumption of the lamps referred to at this rate. The Corporation contend they are only liable to keep an irreducible minimum of 9000 lights burning for an average of ten hours each night.

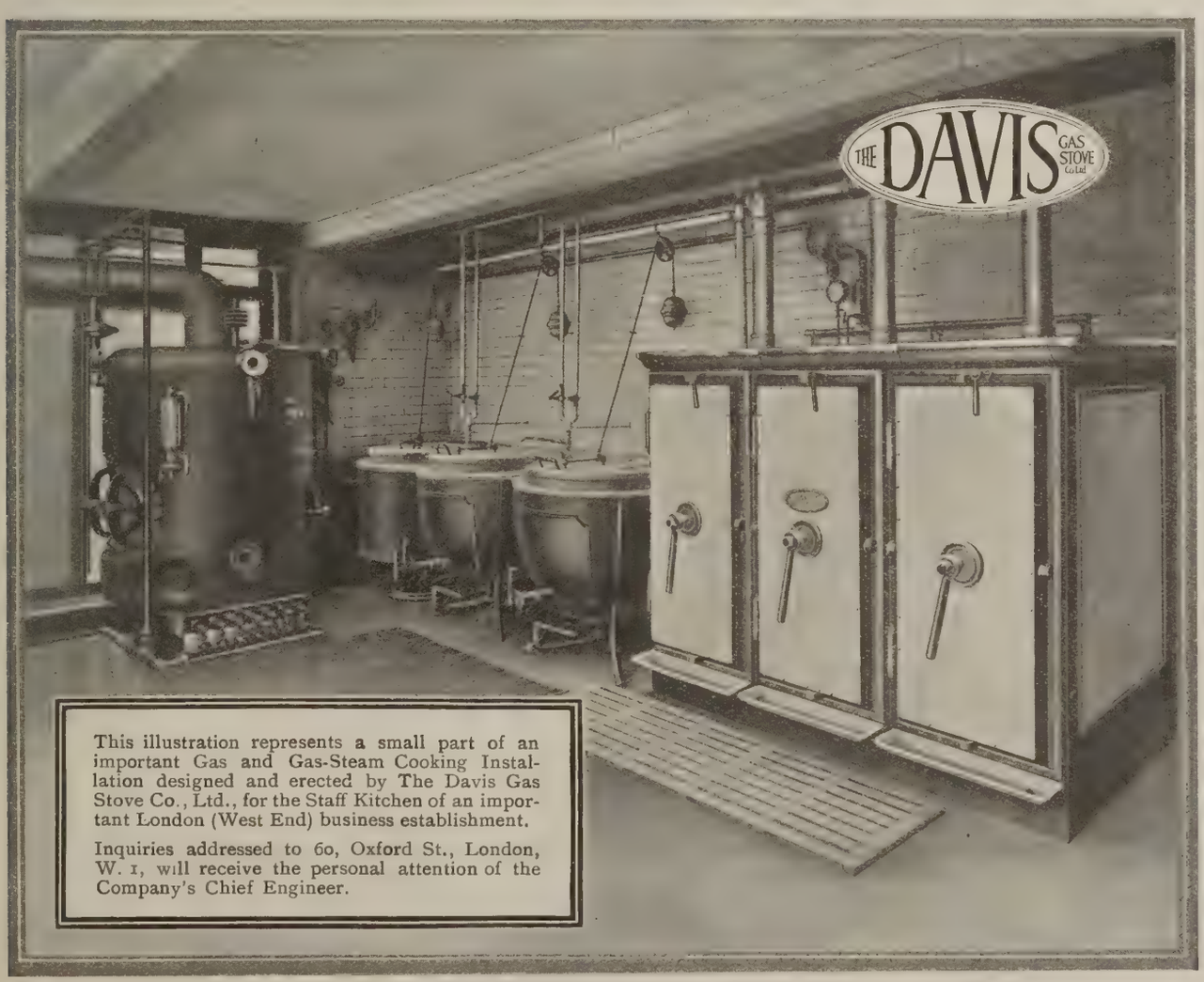
Testing of Burner-Nipples.—In consequence of the increased pressure which came into force on March 1, it was necessary to arrange for fresh tests of nipples to be carried out in the Corporation laboratory. The procedure adopted on all previous occasions has been to test the nipples lighted; and the Corporation contended that this should be continued. The Company, however, objected to this method of test on the present occasion, and first asked that the nipples should be tested unlit. After correspondence, they suggested that the tests should be made with the nipples fitted in the burners, and the gas lit at the nozzles—*i.e.*, as actually in use in the street-lamps.

Discontinuance of Lamps.—The Company have sent in a claim for the cost of gas which would have been supplied to certain lamps during the tenure of the agreement, had they not been discontinued. The Corporation contend that they are only liable to keep the irreducible minimum of 9000 lights burning for an average of ten hours per night, and that they may discontinue altogether or reduce the lighting hours in the case of any lamps over and above this minimum.

Illuminating Power of Gas.—On certain days in March and June, 1916, the illuminating power was found to be defective; and it was decided to deduct a sum from the Company's bills as fines. The Company objected, and filed a suit; but it was agreed that the matter should be referred to arbitration.

Plans Showing Position and Depth of Mains and Services.—The Corporation called upon the Company to furnish plans in respect of certain mains laid by them since the coming into operation of the gas agreement. The Company denied the right of the Corporation to call for plans; and the decision of this question forms one of the matters for arbitration. The point for determination is whether or not the Company are bound to submit plans for approval before laying any mains in any public street.

Damage to Gas-Mains.—Some questions have arisen as to the liability of the Corporation in case of any damage done to the gas-mains by reason of collapsed sewers and otherwise. The dispute really is as to the time within which the Company must prefer any claim for damages, having regard to the provisions of the agreement that such claim must be made within three calendar months from the date of



filling-in of any excavation, while on behalf of the Company it is contended within three calendar months from the filling-in of all the excavations in any road—in other words, from the complete filling-in of the last of the excavations in any road.

On behalf of the Company, proposals for an amicable settlement of some of the questions were made; but after discussion the Corporation resolved that all the matters in dispute with the Company should be decided by arbitration.

"SAFETY FIRST" LIGHTING.

At the last meeting of the London Safety First Council, the Street Dangers Committee reported as follows upon suggestions for the securing of safety. The report was adopted.

The Committee have considered the reference with regard to the suggestion previously made that street-lamp columns should be placed as near as possible to the corners of streets, but not nearer than 2 ft. of the kerb, where the width of the path permits, and, acting upon the advice of the Street Dangers Sub-Committee, desire to point out that this item might deal with others besides street-lamps, and that the arguments in connection with the retention of a 2 ft. minimum may not apply equally to all erections, but that the general question of "Safety First" is best observed by retaining the 2 ft. minimum for thoroughfares subjected to heavy and continuous traffic. Structures such as lamp-pillars, particularly those carrying gas-lanterns, in Central London streets, have, where 21 in. and less from the edge of the kerb, been frequently knocked down by heavy vehicles. By the retention of the 24 in. minimum, the maximum use of the footway is satisfactorily obtained; the space between the lamp-column or other erection and the kerb is not lost, as is largely the case when less than the 24 in. minimum is provided; and the margin of safety is increased.

The minimum of 2 ft. would, it is suggested, be also applicable in regard to sand bins, pillar letter boxes, trees, or guards around the same, and tramway columns—indeed, to any erection of any kind of a temporary or permanent nature where the footway is of the necessary and sufficient width. In this connection, mention may be made of temporary wooden gantries which, in some districts, are not allowed to be erected nearer than 2 ft. of the kerb. Reference should also be made to the bye-laws made by the London County Council on June 30, 1914, for the regulation of lamps, signs, or other structures overhanging the public way, not being within the City of London. By these bye-laws, no lamp, sign, or other structure overhanging the public way is allowed to be nearer the edge of the kerb than 30 in. When full consideration is given not only to the projection of the hub of a vehicle wheel, but also to the sway or overhang of the bodies, and to the projection over the footpath of the bodies of vehicles on roads with a considerable side-hang, or camber, the 2 ft. margin seems necessary for the safety of the public. It is not proposed that this measurement should be taken from any ornamental projection round the base of the structure, but from the main body of the structure at a height (say) of not more than 2 ft. from the level of the footway.

It will doubtless be known that a general practice in the Metropolis is that no footpath or guard kerb in narrow thoroughfares is less than 2 ft. in width, and this width has been found generally to be satisfactory, both as regards use by pedestrians and in providing for the safety of the public against passing vehicles.

The object in fixing this minimum is not only to secure the safety of a pedestrian from accident from falling lamps, and crushing from excessive or encroaching traffic, but is also to secure that he shall be guarded from accident owing to the lantern itself being nearer the edge of the kerb than this provision will ensure.

The minimum of 2 ft. applies to those thoroughfares which are subjected to very heavy and continuous traffic of all kinds. In the case of suburban roads and thoroughfares of a residential character, where the traffic is intermittent and local, the columns would be placed at such a distance from the edge of the kerb as would cause the outer edge of the lantern to be not nearer than 1 ft. from the face of the kerb.

From the artistic point of view, the use is deprecated of standard lamps where the lantern is offset from the column towards the inside of the footway, in order to allow clearance for passing vehicles. Where the footway is narrow, bracket lamps fixed to adjoining property are recommended, particularly where central hung lighting is not obtainable.

It is recognized that there must be positions where from underground structures—vaults, mains, ducts, and cables—it is impossible to carry out the recommendation fully. In all such cases the local authorities will, of course, deal with the matter in the best way possible, as advised by their engineer.

The Committee have reconsidered the suggestion made under the heading "Lighting of Street Obstructions at Night," and recommend that it should be altered to read as follows:

> It is suggested that, except in cases of openings made by tramway authorities, watchmen's lamps, where hung transverse to the direction of the traffic at the ends or sides of trenches or other openings or obstructions in all highways, should not be more than 4 ft. apart, nor more than 4 ft. in height from the surface of the carriage-way, and that illuminated warning boards inscribed "Beware of Obstructions," or other suitable wording, should be utilized where possible.

The Committee have considered a suggestion made by Dr. F. L. Langdon Down, Chairman of the Teddington Urban District Council, that street refuges and other obstructions in the centre of the roadway should show a white light in both directions. The Street Lighting Sub-Committee, who have considered the suggestion, state that they believe it is generally recognized that street refuges should be lighted, but suggest that the light should in all cases consist of more than one lamp or more than one mantle (of smaller candle power) within the same lantern, or by a subsidiary lamp, with a view to guard against a single light being inadvertently extinguished or put out of action by the breaking of the lamp or mantle—thus leading to possible accidents.

The Committee recommend the Council to authorize that a communication embodying the foregoing suggestions be addressed to the local authorities within the Greater London area.

The Committee have had under consideration a suggestion which has been made that red or green lights should be shown at tramway stopping places. The Lighting Sub-Committee report that the suggestion of having illuminated signs to indicate stopping places is a useful one, and might receive special attention in cases where the distance between them is great, and

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MANCHESTER.

particularly at uphill stopping-places. So far as possible, a stopping-place should be arranged to coincide with a lamp-post, so that the light from the lamp might be used to illuminate the necessary sign. Neither red nor green should be used for this purpose; red should be confined to indicating danger obstructions or fire alarms. But "By Request" and compulsory stopping places might be indicated, respectively, by yellow and deep orange coloured illuminated signs,

The Committee recommend the Council to invite the tramway authorities in the Greater London area to adopt the foregoing suggestions.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 2.

Owing to the cooler weather prevailing, moderate quantities of pitch have been shipped, and to-day's price is 38s. per ton in bulk at makets' works. Creosote is steady at from 4¼d. to 4½d. per gallon, and there is a strong demand for this article for various purposes. Solvent naphtha continues to improve. The price is firm at 2s. 3d. per gallon net and naked at makers' works.

A fair number of orders are being placed for sulphate of ammonia for prompt; buyers wishing to take advantage of the lowest price that prevails for the early months.

Tar Products in the Provinces.

July 2.

Markets for tar products remain the same. The price of pitch is nominal.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. 6d. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products for the months of April and May, was 27s. 4d. per ton for each month.

COAL TRADE REPORT.

Northern Coal Trade.

There has been a rather more equal output and shipment of coal—the former having been temporarily reduced by the local holidays. The steam coal trade is much firmer in consequence, and work must now be expected to be a little fuller. Best Northumbrian steams are steady at 30s. per ton f.o.b.; for second-class steams, the price is from about 21s. 6d. to 24s.; and steam smalls are still in plentiful supply, but are on the whole a little firmer at the last quotations given. In the gas coal trade the demand is steady, and prices are generally maintained; while there seems to be the expectation of rather improved values for second-class coal. For best Durham gas coals from 24s. 6d. to 25s. 6d. per ton f.o.b. is the current quotation. Second-class gas coals are from 17s. to 18s.; and for "Wear Specials" the price is near 28s. 6d. to 29s. 6d., with a good demand for the latter kind. Now that the Coal Controller's "directions" [p. 29] seem to be settled, it is hoped that some of the large contracts for gas coal will soon be decided; but as far as can be judged, the changes will not be great from those that have ruled for a year or so—that is generally, though there must be local exceptions. As to Durham coal, there is a strong home demand. This had in degree limited the export; but the variation in the actual realized price has not been great on the average. There are heavy freights—gas coal, Tyne to London 15s. 6d. to 17s. 6d., for instance; and to neutral ports the rates are heavier, owing to scarcity of tonnage. In the coke trade, prices are firm. Gas coke is quoted from 31s. to 32s. 6d. per ton f.o.b., according to kind and place of shipment.

A licence has been granted by the Board of Trade to the United Flexible Metallic Tubing Company, Ltd., to manufacture under a German patent for flexible metal tubing.

A news telegram states that the German Press is showing serious alarm regarding various economic matters. The great scarcity of coal has compelled the authorities in Berlin to cut down the lighting of the city generally by two-thirds.

The Spenborough District Council have appointed a Special Committee to consider the question of the Council acquiring stocks of coal which, if necessary, might be sold to people at a reasonable price. Such coal will probably be stored in the gas-works yard.

It is announced that the undertakings of Messrs. Chance and Hunt, Ltd., of Oldbury, Wednesbury, and Stafford, are to be consolidated with those of Messrs. Brunner, Mond, & Co., Ltd., who are acquiring a majority of the ordinary shares of the former concern.

The Halifax Corporation Gas Committee have accepted the tender of Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, for the supply and erection at the gas-works of a new cyanide washer, for the sum of £2100. Messrs. Holmes are to take down and retain possession of the scrap material from the existing machine.

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See "GAS JOURNAL" for Feb. 20, 1917, pages 347-349.

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Tipton Gas-Works Accounts.

Mr. William Prince, the Engineer and Manager of the Tipton Urban District Council Gas-Works, has forwarded a copy of the accounts of the department for the year ended March 31 last. The revenue account shows receipts amounting to £29,985, as compared with £28,416 the previous year; the balance of gross profit carried to profit and loss account being £7164, as against £7696. To this has to be added £4 bank interest, making a total of £7168. Interest on mortgages amounts to £1403, and sinking fund charges for redemption of loans to £3250, leaving a net surplus of £2515 to be carried to the accumulated profits account, bringing this account up to £10,806. The quantity of coal carbonized was 12,434 tons, as compared with 12,354 tons a year ago; the gas made being 160,163,000 c.ft., as compared with 157,329,000 c.ft. The make per ton of coal carbonized amounted to 12,880 c.ft. last year, and to 12,735 c.ft. for the preceding twelve months. In neither year was any water gas added. Leakage, condensation, &c., figures at 11·67 p.ct., as against 8·23 p.ct.

Reduction in Price at Lancaster.—The Lancaster Town Council have agreed to a recommendation of the Gas Committee that, until further notice, the price of gas (other than for motive power) shall be as follows: For ordinary consumers, 2s. 7d. per 1000 c.ft., instead of 2s. 10d. as at present (less 2d. discount); for prepayment meters, 30 c.ft., instead of 27 c.ft. as at present, for 1d.

Loss on the Portland Gas-Works.—When the half-yearly gas-works accounts came before the Portland Urban District Council, Mr. Allen said it was not a very good balance-sheet. Coal had cost £300 more for the same quantity than it did in the previous year; and this accounted for £300 of the loss of £1024 on the half-year's working. Their losses had been rather heavy; but repairs were doing it. Mr. Kelly agreed that it was not a report one liked to look at. It was not the fault of the Committee or the Manager, but of the Council generally, or the Committee of years gone by. The works had been allowed to go back. Instead of keeping them in good repair, previous managers had striven to show a surplus. To put the concern in order would cost somewhere near £2000; and unfortunately the district rate would have to face it. The works had been a burden ever since the Council took them over. Mr. Edwards remarked that, although the price of coal had increased, the charge for gas had been raised 6d. per 1000 c.ft. The make of gas per ton had gone down from 12,259 c.ft. to 11,200 c.ft., while the total amount of unaccounted-for gas had risen from 10 to 18 p.ct. Mr. Allen replied that there used to be no proper check on the amount of gas made. The report was adopted. Writing in the local "Telegram," "Nemo" says: "It would almost have paid the Council better to have shut the works up the moment they had paid the original £28,000 for them; for from first to last they have spent about another £28,000 on works that have been a burden ever since they passed into the Council's hands. If ever anyone did believe in municipal enterprise, association with these works would knock the idea out of their heads."

Protected Trades and Tribunal Exemptions.

At the session of the Lewisham Tribunal on Monday of last week, a letter was read from Mr. Wilfrid Wastell, the Secretary of the South Suburban Gas Company, drawing their attention to a report in the "Journal" of certain proceedings before the Southwark Tribunal, which resulted in a decision exactly the reverse of that given by the Lewisham Tribunal a week earlier. From the cutting enclosed, the Military Representative was reported to have stated that, acting under the latest instructions from the War Office, he was not asking for the withdrawal of Tribunal exemption certificates in cases such as the Company's. Apparently the Lewisham Military Representative (Captain H. E. Harry) had not received these instructions at the time the Company's cases were before the Tribunal; and in view of the altered position, he (Mr. Wastell) asked that the matter be submitted to the Tribunal, with the view, if possible, of restoring the exemption certificates which had been withdrawn. Captain Harry: I have no instructions, and I do not know of any being given. The Chairman (Mr. F. Mead): I think Mr. Wastell might be informed that if at any time the certificates granted by the Munitions Area Recruiting Officer are withdrawn, we will re-hear the Company's applications. The Clerk: You included that in your order of last week. Captain Harry: The Company are safeguarded in every way.

Prepayment Meters in Manchester.—At present there are nearly 78,000 prepayment meters in use in Manchester, and the money deposited in them is collected once every eight weeks. The aggregate weight of coppers for the year amounts to about 285 tons. Before the war the collection was made every six weeks.

Alleged Gas-Works Nuisance at York.—At the York City Council, a memorial, signed by 52 residents in Monkgate and district, was read complaining that there was a greatly increased nuisance of smoke, dirt, and noise from the gas-works, and asking the assistance of the Council in its abatement. The memorial was referred to the Health Committee. Subsequently, Mr. H. E. Bloor (the Manager of the Gas Company) attended before the Committee and fully explained the methods adopted to prevent the nuisances complained of. He stated that alterations were being carried out which, when completed, would, it was hoped, materially reduce the discharge of smoke; while as to the complaint from dust, there had been trouble from this, but it was now practically abated by the covering-in of the machinery. The noise he was afraid could not be reduced. But for the new machinery and works being carried out, which had been rendered necessary by the shortage of manual labour, the supply of gas during the past two years would have been seriously interfered with, if not stopped, to the great disadvantage and loss to the citizens. The Directors and himself were anxious to do all reasonably in their power to avoid creating nuisances of any kind; and he would consider various suggestions made to him in regard to the matter. The Inspector of Nuisances was instructed to keep the works under observation.

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Increase in Price at Salford.

The price of gas was under discussion at a meeting on Friday of the Salford Town Council. At a previous meeting, the Gas Committee's recommendation to increase the price by 4d. per 1000 c.ft. was referred back to the Committee, along with an amendment that 2d. should be knocked off the discount allowed. The Gas Committee at Friday's meeting recommended that the discount of 4d. per 1000 c.ft. allowed to consumers by ordinary meters should be reduced to 2d., and that the price of gas should be advanced by 2d. Further, that the supply of gas through prepayment meters should be reduced from 27·27 to 25 c.ft. for 1d. Alderman Phillips (the Chairman of the Committee) said the question of gas production was causing considerable concern all over the country. It was said they were charging more for gas than Manchester. The fall in the consumption of gas in Salford was much greater than in Manchester, because the bulk of the Salford supply went to small consumers. Manchester had many large consumers, while Salford had very few. During the three years of war, the cost of manufacturing had increased by £126,450. The increased amount received for the commodity amounted to £91,405, and for residuals £16,994. By Act of Parliament they were forced to pay £10,000 towards the relief of the rates; and the present deficit was £24,939. If they adopted the Committee's recommendation, this could be wiped out in three years, and the undertaking would have money in hand. They must agree to increase the price, or saddle the future generation of consumers with a considerable debt. Eventually, the Committee's recommendations were adopted.

National (Unemployment) Insurance.—The Umpire has decided that contributions are payable under the National Insurance (Part II.) (Munition Workers) Act, 1916, in respect of workmen described as sheet metal workers, and engaged in the manufacture of portable gas-heated boilers, domestic gas-meters, and sheet metal generators for acetylene or petrol gas.

Wages at Dundee.—The National Union of General Workers having made an application for an increase of wages to unskilled and semi-skilled employees at the gas-works, a discussion took place as to what was the standard rate for labourers. At present these men are paid 8½d. an hour; and it was agreed to give them another 2s. 3d. a week, so as to bring the rate up to the 9d. which was declared to be the standard.

Ilkley Strike Ended.—The strike of municipal council employees at Ilkley ended last Tuesday; the men accepting the Council's offer of an additional 2s. per week war bonus, though the gas workers, in particular, had contemplated standing out for 6s. per week. During the short dispute, a number of residents gave voluntary service which prevented the stoppage of the gas supply to the town. The town and its three military hospitals are much dependent on gas for cooking.

Wages at Shipley.—The Shipley District Council have approved in principle, with the proviso that actual apportionment must be settled by the various committees concerned, so as to meet special cases, the Finance Committee's recommendation granting a further advance of 5s. per week on pre-war rates—making 12s. in all—in the pay of Council workmen, particularly in the gas, electricity, and highways departments. The advances are retrospective as from May 1.

South Metropolitan Gas Company's Increase in Price.—In explanation of the action of the Directors of the South Metropolitan Gas Company in increasing the price of gas to 3s. 1d. per 1000 c.ft., Mr. F. M'Leod (the Secretary) pointed out to a representative of the "Daily Telegraph" that the rate charged immediately before the war was 2s. 2d., and while the cost of production had about doubled, the price of gas to the consumer had been increased by only about 40 p.ct. This result had been rendered possible by the material increase in prices obtained by the Company for certain residuals. But, apart from this, the Company had been anxious to keep the price as low as possible, in view of the fact that the greater part of the district they supply is inhabited by the working classes and people of small means.

Swansea Corporation and the Calorific Standard.—Reporting to the Swansea Corporation upon an inquiry which took place last April before Mr. Garnham Roper, with regard to the opposition of local authorities and railway companies to Orders under the Calorific Standard Act, the Town Clerk said that, in spite of the efforts made by Mr. G. J. Talbot, K.C., for the railway companies, by himself, on behalf of the Corporation, and by Mr. E. Harris, for the Swansea Rural District Council, they had been unable to get the Board to agree to all the clauses and amendments proposed. He added that Mr. Talbot and himself had suggested that the whole matter should be made the subject of a Departmental Inquiry. Subsequently, the Board of Trade addressed a letter to the Corporation, in which they say that, "while the Board are fully alive to the desirability of an early determination of the technical matters affecting the supply of gas generally which have been raised by various interests, they do not feel themselves justified in deferring the consideration of the applications for Orders under the Act pending the result of the contemplated investigation into those matters."

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "Journal" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

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Biddulph Gas-Works Loss.—For the ensuing year, the rates in the Biddulph urban district are to be 5s. in the pound, which is an increase of 1s. 5d. on last year. This state of affairs is stated to be largely due to a loss on the gas-works, which one member of the Council declares will always have to be supported out of the rates.

Gas Consumption in Germany.—The latest statistics of gas production by German gas undertakings, collected and issued by the Central Gas Publicity Bureau, which has its headquarters in Berlin, relate to the months of December and January last. They are in continuation of the figures for Sept.-Nov. last given in the "Journal" for April 17 (p. 104). In December, 1916, 747 German gas-works produced 3·2 p.ct. more gas than in December, 1915, and 15·1 p.ct. more than in December, 1914 (which month showed a great reduction on December, 1913). In January last, 743 works produced 3·4 p.ct. more gas than in the corresponding month of 1916, and 11·9 p.ct. more than in January, 1915. The January figures for consumers' meters show that in the two years the number of ordinary meters in use increased by 14·6 p.ct., and of prepayment meters by 30·8 p.ct. In January last, 44 works were supplying, in all, 15,375 consumers at a flat-rate per month or quarter—thus dispensing with that number of meters, the supply of which in Germany has not kept pace with the demand since the outbreak of war.

Bispham and an Electricity Deficit.—It was reported at a meeting of the Bispham-with-Norbreck Urban District Council (it was probably the last "budget day" before the amalgamation of the district with the borough of Blackpool) that the electric lighting undertaking expenditure was £2788, and the receipts £1993, a net gain of £90 on the estimates, due to the increased charges. The total deficiency was £795, equal to a 7d. rate; and the estimates this year provided for a deficiency of £965, equal to an 8d. rate.

Ilford Gas Company and Electricity Audit.—A letter from the Local Government Board was read by the Clerk at the last meeting of the Ilford Urban District Council, with reference to an appeal submitted to the Board against the allowance at the audit of the accounts of the Council for the year ended March 31, 1914, of certain expenditure included therein relating to the electricity undertaking. The Board forwarded a copy of a letter they had addressed to the appellants, the Ilford Gas Company, stating, *inter alia*, that, in all the circumstances, the Board consider the case is one in which they may properly exercise the power conferred on them by section 4 of the Poor Law Audit Act, 1848, as applied to the audit of the accounts of the Council, to determine the appeal on the merits, and accordingly decide that the accounts for the year named, so far as they are affected by the appeal, shall stand as allowed at the audit.

STOCK MARKET REPORT.

The only thing the matter with business last week on the Stock Exchange was that there was so little of it—the House was "sick of a calm." The persistent paucity is becoming chronic; but this scarcely makes it less hard to bear. Towards the close of the week, indeed, business was tapering-off to a very fine point; for there was a longer break than usual staring members in the face. The House was to be closed on Saturday and on Monday too—yesterday being a special extra Bank Holiday to allow depleted bank staffs to make up their half-year's accounts. However, notwithstanding the quietude, the general tone of markets was satisfactory, and prices in many departments even improved upon their firm positions of the preceding week. Among the favouring factors to stimulate advance were the continued pressing-back of the enemy upon the Western front, the glad tidings of the arrival of United States forces upon the scene, and the smart prosecution of war measures in Greece. To these might be added the Minister of Munitions' oration in the House of Commons.

Thus fortified, the gilt-edged had a cheerful week. Home Government issues were firm, and War Loan, Consols, and others, and Colonial and Indians improved. Home Rails hardly sustained their strength up to the close. The American Market was firmer, and Argentines were in favour, influenced perhaps more by confidence in the future rather than present conditions.

In the Foreign Market, Brazilians were in special demand, thanks to the rising exchange and general prospects. Japanese were firm; but Russian and Spanish gave way. Among the Miscellaneous, Rubber was dull, and Textiles eased away. Iron and Steels, Shipping, and Breweries were well supported.

Business in the Gas Market, as might be expected in such a quiet time, was on a very moderate scale, and not even the biggest issue could count a dozen bargains. Movements in prices marked and in quotation were irregular. Gas Light ordinary was a point easier, and South Metropolitan receded three points, in view of the rise of 5d. in the price of gas, involving a reduction in the rate of dividend to 4 p.ct. for the half year now commencing. Imperial Continental recovered a point.

The Money Market was quite easy almost up to the close, when there was a good demand as usual at the half-year's end. Rates for discount relaxed.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 71⅛, 71½, 72, ditto maximum 57¼, ditto debenture 56, Monte Video 8⅛, South Metropolitan 77, South Suburban 76¾, 77¼. On Tuesday, British 33½, 33¾, ditto Norwich debenture 60, Commercial 4 p.ct. 73½, 73¾, 74, Gas Light ordinary 71, 71½, 72, ditto maximum 57, 57¼, Imperial Continental 82, 83, Lea Bridge 85⅛, 85½, Tottenham "B" 69¾, 70. On Wednesday, Bombay 4 13/16, 4 15/16, 5, Imperial Continental 81, 82, South Metropolitan 76¾. On Thursday, Brentford "A" 82¼, 82½, ditto "B" 80½, Gas Light Ordinary 71, ditto preference 73¼, ditto debenture 56⅛, 56⅜, Imperial Continental 81, Metropolitan of Melbourne 94½, San Paulo preference 8, South Metropolitan 75. On Friday, Gas Light ordinary 70½, 71½, 71⅝, 72, ditto preference 73, 73½, ditto debenture 55⅞, South Metropolitan, 74½, 75, 75½, 76, Watford "A" 108⅜, 108½, ditto "B" 85⅜, 85½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div. or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5¼	4 1/16—5
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water: 10 p.c.	29—30	24—26	..
383,110	10	"	7	7/-	Bournemouth Gas and Water: B 7 p.c.	15—15¼	10⅜—11¼	..
115,000	10	"	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	9¼—9⅜	..
159,740	—	—	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	6⅞—7*	..
992,045	Stk.	Feb. 26	14	55/-	Brentford A Consolid.	261—266	81—84	82½—83½
734,920	"	"	11	53/9	Do. B New	204—209	79—82	80½
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	83—88	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	"	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	"	"	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33½—33⅝
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66*	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—56*	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1⅜—2⅜	2⅛—2⅜	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6—7	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65*	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	"	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	73½—74
560 000	"	"	5⅓	46/8	Do. 3½ p.c. do.	103—105	66—68	..
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	60—62	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅞%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½—18	11½—12½	..
16,313,430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke: 4 p.c. Ord.	98—102	70—72	70¾—72
2,600,000	"	"	3½	3½%	Gas Light and Coke: 3½ p.c. max.	76—79	56—58	57—57½
4,062,235	"	"	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	72—74	73—73½
4,674 850	"	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	55—57	56—56⅛
130,000	"	"	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
2'8,740	"	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16½	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅞%	Ilford A and C.	151—154	102—107	..
65,780	"	"	6⅜	5⅞%	Do. B	115—118	80—85	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb	92—94	66—69*	..
4,910,000	"	May 14	9	4½%	Imperial Continental	150—160	80—85	81—83
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	85⅛—85½
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	81—83	..
					Liverpool 5 p.c. Ord. B	146—148		
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅝	3⅞—4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	94½
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8⅛
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70½—71	70¾
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	71—73*	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	92—97	..
100,000	50	"	12	11%	Do. C	118—121	85—90	..
52,000	50	"	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1⅞—2⅛	..
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4½—5	2⅜—3½	..
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	57—61*	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½—11	7⅜—8¼	8
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47—49	42—44	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	"	"	10	10%	Do. B	222—224	178—182	..
523 500	"	"	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African.	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	74—76	74½—77
1,895,415	"	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	56—58	..
224,820	"	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	"	"	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	76½—77¾
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135.000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88*	..
647,740	"	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	"	Feb. 12	7½	5%	Tottenham District: A 5 p.c.	135—138	95—100	..
782,275	"	"	6	3⅛%	Tottenham District: B 3½ p.c.	115—117	68—73	69¾—70
181.255	"	June 26	4	4%	Tottenham District: 4 p.c. Deb.	87—89	63—65	..
182.380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c.	151—156	114—119	..
255 636	"	"	6⅛	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	"	"	5/17/3	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	"	"	6⅛	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	"	"	6⅝	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53*	..

* Ex. Div.

GAS JOURNAL

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EDITORIAL NOTES.

The Coal Controller's Redistribution Scheme. Position of Contracts.

THE matter of greatest importance to the gas industry, and to all other large coal consumers, in our columns this week is the information as to the coal redistribution scheme, to which effect is given by an Order of the Board of Trade, and which has been developed by the Coal Controller (Mr. Guy Calthrop) and his staff, after the collection of a large mass of statistics and their study, a free interchange of views with the District Coal and Coke Supplies Committees, representative coal factors, merchants, and consumers, and the Railway Executive Committee. From the particulars, it is clear that nothing has been left undone that could be done to ensure a scheme of a practical nature. Naturally, large coal users will not care to be disturbed from their normal lines of supply or from the contracts that, in their wisdom and experience-created preference, they have already made for the present contract year. But the situation of transport, current and prospective, has to be faced; and there is an obligation upon everyone who is not fortunate enough to be within a defined area from which the coal for which he has contracted is derived, or who obtains his coal by sea, to do his part to work to establish quickly the scheme and to aid in relieving the critical position of rail transport that menaces next winter. The penalty of neglect will be his own burden. For the gas industry, it is a great pity—but, of course, a scheme of this magnitude cannot be investigated and framed in a few days—that the redistribution plan was not available before the work of negotiating and settling new contracts was entered upon this year. But it could not be. So the best has to be made of it; and, what is more, the best use should be made of the period between now and Sept. 10 (when the scheme comes into operation) to get all possible coal into stock under the present contracts, which—with the exception of those for coal produced and consumed within the same area, and those for seaborne coal—will be automatically annulled at 6 p.m. on Saturday, Sept. 8. We may take it, however (the point is one which ought to be made abundantly clear by the Controller), that those who have long-distance contracts between areas recognized by the scheme will not come under this wholesale cancellation. Otherwise there may be some inconvenient attempts to shuffle out of contracts, some of which have been entered into by the buyers with the view to complying with the earlier order as to purchasing from the nearest available areas. However, the abrogation of contracts means that, in addition to utilizing the interval in obtaining all possible coal under present contracts, those affected will have to arrange their new contracts well before Sept. 8—for safety and freedom from anxiety, the earlier the better. The scheme, by the way, does not affect coke.

Let this be borne in mind, that the object of the scheme is to satisfy the coal requirements of the country at large, and that "satisfaction" now resolves itself solely into traffic economy. It is believed that the scheme will result in relieving congestion on the railways, that it will assist the coal trade generally in getting a better "turnover" for their wagons, that it will minimize stoppages at collieries due to delays in the working back of empty wagons over long distances, and from awkward points involving cross country journeys, and that it will economize in marshalling wagons and shunting. It is useless to attempt, before trial, to criticize a scheme so novel, though the collieries and the consumers concerned will, no doubt, from their individual standpoints, see matters for criticism. But this is a question of national importance, and must be viewed from the broadest standpoint. When it is learned that the haulage under the scheme of only 42 million tons of coal per annum out of the total consumed in this country will, according to an approximate estimate, mean a saving of no less than 700 million ton-miles in the transport of coal by rail, it will be realized that, given success, a great work will have been accomplished.

The descriptive article in later columns explains the principles on which the scheme (which deals with long-distance haulage, but short-distance haulage will probably come under treatment later) has been constructed; and it shows that every useful detail that the Coal Controller, in consultation, has been able to introduce into the new distribution system has been brought to bear in order that changes of coal sources and destinations shall be made with as little friction and difficulty as possible. Great Britain has been divided into twenty coal-consuming areas, as shown by a sketch map which we also publish, and the boundaries of these areas will be seen by the appended lists of the towns adjacent to their limits. Lines on the map (drawn from the producing to the consuming areas) indicate the areas from which consuming areas not possessing a coal supply of their own or an inadequate supply may obtain coal by rail. This map is one of perfect simplicity in the matter of directness of supplies in comparison with one which we have that shows a perfect cobweb of crossings and re-crossings of coal in its rail conveyance in December, 1916. Though the re-arrangement will mean inferior coal for some gas undertakings and superior coal for others compared with their customary purchases, if the cobwebbed map can in practice be transformed into the clean straight lined map that we publish, there should be a good chance of those computed hundreds of millions of ton-miles being saved which will be to the country's benefit.

Those holding contracts for coal travelling long distances from one area to another—assuming that the contracts do not comply with the scheme—will, in setting about the making of their new contracts, place themselves in communication with the Coal and Coke Supplies Committee with whom they will have to deal, a list of which Committees we also publish. These Committees (which have been reinforced by an independent representative appointed by the Coal Controller) will conduct the necessary arrangements for putting the new scheme into operation; and, acting as intermediaries, they will save collieries and would-be customers the task of searching for each other. There is a safeguard to which special attention should be directed. It is that, should any factor, merchant, or direct consumer not hear from a colliery by Aug 27 that it has been authorized to send supplies, a communication should be at once made to the District Supplies Committee concerned stating full particulars, in order that inquiries may be made and arrangements effected to ensure a supply before the scheme comes into operation. There may be some little difficulty here. It is, of course, not known how far the statistics obtained by the Coal Controller assure him that production and demand by paired-off areas will have equilibrium. This, however, is one of the factors to smooth working; but it is a difficulty which, if it occurs at all, will (unless for certain areas sea transport breaks down further, which is, of course, a contingency that must be reckoned with) be one for the Supplies Committees to deal with. It is obvious that without the Supplies Committees to act as intermediaries, the scheme would fall before the chaos that would be created. In regard to the supply of special grades of coal where these are necessary for special purposes,

certificates will be issued; but this is a matter that will not affect gas undertakings.

A point which was raised in an editorial on this subject last week was as to the effect of the geographical redistribution on the operation of the Price of Coal (Limitation) Act. We are glad to be able to state that the Coal Controller intends to enforce obedience to the law, and that, in the making of new contracts (with collieries with which customers had not made contracts before) the "corresponding price" will be that paid at that mine, in the words of the Act, on the corresponding date—or as "near thereto as having re- "gard to the course of business may be practicable—in the "twelve months ended the 30th day of June, 1914." In the article in other columns, it is remarked that the Coal Controller intends to deal with those guilty of an infraction of the Act "in no uncertain manner." There is more in these words than meets the eye. That he regards the observance of the Act as most important is seen from the fact that all questions touching attempts to evade it are going to be dealt with by his department direct, and not by the local Coal and Coke Supplies Committees. It is worth knowing that there exists good evidence that there is going to be firm control in this particular direction.

While the Coal Controller has encountered difficulties and objections in constructing his scheme, in the main he has met with the greatest encouragement. By all concerned, it must not be forgotten that he is working for the nation, and not for himself.

Economy and Health through Gas Cooking.

It is not remarkable that the position and the possibilities of the gas industry should, through the war, have impressed themselves with good effect upon our Government Departments. The members of the Government now know full well that this country entered the war with a very small store of high explosives, that the then production of explosive-making materials by the coke-oven industry and the distillers of gas-works tar was totally inadequate to the requirement, and that it was only by a response by the gas industry to the request to specially work to make up the heavy shortage and to furnish a margin (which it has done) that the country and its Allies were saved from an irreparable disaster, also that munitions production was accelerated by its gas-furnaces, that hundreds of thousands of our munition workers were provided with food cooked by its gas ranges and boilers, and that many industries after the war will be depending upon it not only for light, heat, and power, but largely for the secondary products essential to their work and progress. Knowing these things, no responsible man can do aught else than come to the conclusion that at all costs, for the security of the country and its manufacturers, the gas industry must not only be protected, but must be encouraged to expand its services. There are other things, too, which have struck responsible men, as to the service the gas industry renders to the community. They see in the work it is doing collective and individual economy, and the promotion of health.

On more than one occasion lately, there has been from high quarters advocacy, in connection with fuel economy and the provision of explosives, of the use of gas and coke as fuel, in order to allow a large proportion of the coal now burned to ash in household grates to be employed to greater advantage. Only last week there was renewed advocacy, but for another reason. We have been hearing and reading a great deal about the importance to the nation of baby and its welfare; and a campaign has started which is intended to improve the physical conditions of the new and the coming generations. Hitherto a great deal has been done in the schools and subsequently for bettering the physical conditions of boys and girls; but the start of the work has not been early enough. We have to get back to the embryonic stage to do the maximum amount of good—first, by improving home conditions and by providing the means for securing well-cooked and nourishing food for expectant mothers, and then to see that children from the hour of their birth are well-cared for. The ways in which so desirable a state of things is to be accomplished are several.

The President of the Board of Education (Mr. H. A. Fisher) spoke of some of them at a successful demonstration associated with "Baby Week" at the Guildhall in the City on Monday, the 2nd inst. He mentioned, among other sound ideas, better housing, in association with which he suggested that two "cardinal principles" should be observed —namely, that hot water should be laid on to all dwellings, and that a gas-cooking stove should be put into them. In these ways, mothers would be relieved of hours of useless drudgery, and able to pay more attention to their children. The gas industry takes some credit to itself for having anticipated this, though heretofore it has not had much assistance from the governing authorities, notwithstanding that in all directions the gas cooker and the gas-fire have demonstrated their economy and health promoting merits. Already the gas industry has some four million and many odd thousands of cookers in use in the United Kingdom; and this enormous number does not include privately owned ones, gas-fires, and other gas-heating appliances. What this number of cookers has meant in labour-saving, in the promotion of cleanliness, in the provision of well-cooked food, and therefore in the promotion of health, is incalculable, and what it would be if gas or coke heating became universal is beyond imagination. Besides the actual accomplishment, the gas industry has been doing a large amount of work in connection with the Food Economy Campaign and the Communal Kitchens, in which directions the British Commercial Gas Association has been very active, while upon local Food Economy Committees gas officials have been serving, and putting their knowledge and experience to good use.

But it is all very well to talk of the extension of these health-exalting conditions. Action is required. The Local Government Board are looking into the matter of better housing, and other improvements after the war. The President of the Department (Mr. Hayes Fisher) states that an inquiry is being made of local authorities as to what they are prepared to do in these directions. We cannot say that, though there is much economy inherent in the use of gas for cooking and heating purposes, the local authorities have done much, though to the interest of the community, to foster it. As the other Mr. Fisher truly remarked, the employment of gas-cookers (and we may add of gas-fires and water-heating appliances) relieves a household of a vast amount of useless drudgery. This is putting the matter in a very general way. It goes further than that, as experienced readers know. But we will make brief allusion to the benefits for the information of those who are interested and are influential, but have not intimate contact with the industry. The saving of labour in the household is obvious; and labour-saving is a factor in labour efficiency. We shall in the future want all the output that labour in any usefully productive quarter can effect through saving and higher efficiency. Labour being needed in the working man's home (where coal is the fuel) for fire lighting and attendance and getting the oven to proper temperature, this is often a deterrent to the cooking of food, which frequently means the purchase of cheap, indigestible cooked food of inferior order. Convenience for ready cooking promotes a preference for freshly prepared food at home, and thus contributes to health. A further subscription to labour-saving is that, to the extent that gas is employed for any form of heating, coal has not to be purchased, carted, and handled in small quantities, storage is saved, and the atmosphere is proportionately less polluted by smoke, and again health and cleanliness are promoted—cleanliness in homes and brighter cities and towns generally. This last point is one for all local authorities to consider; but they do not do so in any great measure. In this regard, as things have been, so many of them are content to let them be. Another point which does not appear to strike them is the fact that the more fuel is conveyed by pipes underground, the more will the surface of the roadways be relieved of the frequent cartage of coal by heavy coal-wagons, with their continual effect on wear and tear.

We have spoken of collective and individual economy, and of a general health promotion, by the conversion from bituminous coal burning to the gaseous method in the household. Even so, it is found that gas-cookers and gas-fires have not been encouraged by local authorities, who do not own gas-works; and certainly some of these who do own gas-works have not, strange to say, done all that they might have done in this direction. For instance, from "Field's "Analysis" of the accounts of the principal gas undertakings, it is seen that the percentage of gas-stoves on hire in relation to the number of consumers is, in the case of the Gas Light and Coke Company 85, South Metropolitan Gas Company 99, Commercial Gas Company 75. Of the Suburban Companies, Croydon boasts of 107 p.ct., the South Suburban of 106 p.ct., Brentford of 100 p.ct., Wandsworth of 96 p.ct., the others range between 72 and 79 p.ct. Of the

Provincial Gas Companies, Brighton can claim 106 p.ct., Bristol 84 p.ct., the others range between 60 and 77 p.ct. But when the data for the Provincial Corporations are examined, it is seen that, excluding the very exceptional cases—Birmingham with 83 p.ct. to its credit, Leicester with 98 p.ct., and Manchester with 76 p.ct.—the remainder run from only 2 to 50 p.ct. Of course, it may be that some of these prefer to sell stoves rather than let on hire; but that is a short-sighted policy in view of the undeniable collective and individual advantages derivable by promoting, by every reasonable expedient, the change from coal to gas. It is hoped that, in connection with housing and health schemes, there will be on the part of local authorities more liberal appreciation of these advantages, and a desire for their acquisition as being as important as the provision of other health-promoting means.

The President of the Board of Education suggested that hot water should be laid on to every house. A general hot-water-supply service would be a big task; and it is an idea that is encompassed by heat losses and heavy capital expenditure which mean uneconomy of a large order. There is a simpler way of getting hot water in the quantity and just as required, without premeditation or prearrangement. Up North many cottages and tenements possess gas-heated water-boilers; and everywhere better-class dwellings are to be found with flue-fitted geysers or gas-heated water-circulating boilers. In these subjects affecting health promotion, the war has created a new interest and a lively concern; and an immediately available direction for doing immense good (though the prepayment system of gas supply has already worked wonders) is through the cheaply installed, economically operated, convenient, reliable, labour-saving gas mode of cooking and heating. What the Government must do is to help gas undertakings by every possible means to cheapen gas supply, and not to obstruct such a desirable end. That has been a regrettable mistake in the policy of the Private Bill Authorities, and in defiance of the findings of disinterested and judicial parliamentary investigation.

Inert Constituents and Manufacturers' Agreements.

The efforts made by corporations and railway companies to prevent the passing of Calorific Standard Orders pending a full investigation of certain technical matters which they have raised, have been futile. The plea that this should be done was submitted to the Board of Trade by Mr. G. J. Talbot, K.C., on behalf of the railway companies, and was supported by the corporations. But the Board, announcing their decision, upon the application, stated that, while fully alive to the desirability of an early determination of certain technical matters affecting the supply of gas generally, they did not feel themselves justified in deferring consideration of the application for Orders under the Standard of Calorific Power Act pending the result of such an investigation. One of the proposals was for the calorific standard to take into account the presence in town gas of inert constituents. It will be seen from this that there is no intention of letting the matter lie dormant, but that, as soon as there is an opportunity, it will be revived, with all the evidence that has been procured by analysis of samples of gas taken here, there, and practically everywhere. The "Engineering Correspondent" of the "Daily Telegraph" referred to the matter last week, and pointed out that percentages of inert gases as high as 30 and more had been found in gas supplies. He spoke of the unfairness to consumers of such an amount of incombustibles, and submitted what is appreciated in the gas industry, except by those who wittingly or otherwise are guilty of this practice, that such procedure is not in the best interests of gas undertakings. This reference in the Daily Press shows that the matter is coursing-out into greater publicity, and is, in fact, getting to the ears of consumers, from whom trouble may be expected. The writer in our morning contemporary goes further, and suggests to manufacturers that, before putting in gas-heated metal-melting appliances, they should have an understanding with the gas undertakings as to the maximum percentage of inert gases permissible in the gas supplied, and that the manufacturers themselves should make analyses and calorific tests of the gas supplied in order to see that they get what they pay and bargain for, which is combustible gas, *plus* the unavoidable quantity of inert gases according to the coal used and the conditions of carbonization. The position to which this matter is being driven is one for which those directing gas undertakings in which care is exercised as to the constitution of the primary commodity will hardly be prepared to thank those gas undertakings that have been found bad and persistent defaulters.

The Statutory Maximum the Only Coal Price.

The Price of Coal (Limitation) Act is particularly well named. The "limitation" is to-day sincere and decisive. In an editorial article last week, attention was called to the fact that, under the newly-issued conditions as to the sale of coal, it is directed that "no coal shall be sold by collieries for consumption in the United Kingdom except at the maximum price under the Price of Coal (Limitation) Act." This direction, we remarked, "appears to be at variance with the intention of the Act, which was to fix a maximum without binding generous coalowners to charge less if they found it possible, and were willing," which is not often the case. From a letter sent out by the Board of Trade, our reading seems to be the one officially intended, the intention being due to irregular external conditions producing in certain coalfields fluctuations of price which disturb the regularity of the distribution of coal. Naturally people want to buy in the cheapest market; and so again economy of rail transport is at the bottom of what struck us as a strange official decree. This is what the letter says: "The Controller's attention has been drawn from time to time to cases in which temporary conditions, such as shortage of shipping, have produced fluctuations in price which have no real justification in the general conditions of the market, and only interfere with the regularity in the distribution of coal which is so desirable at the present time. He considers it necessary, therefore, to instruct all colliery owners that in future, except in cases in which he otherwise directs, prices for inland consumption must remain at the maxima fixed under the Price of Coal (Limitation) Act." A coal contemporary observes that it is something of a surprise to find the Act used to prevent prices falling below the maxima.

Heating Gas and Complete Gasification of Coal.

In Germany, as in this country, consideration is being given to the question of the best methods of developing the industrial load of gas undertakings by the supply of a gas low in inert constituents and of high-flame temperature. But they are not confining themselves to talk; they are working upon the improvement of processes having for their object the complete gasification of coal, and the recovery of the maximum yields of high-class oils and ammonia. One such process is that of the Dellwik-Fleischer Water-Gas Company, about which process information has been given in a paper by Dr. A. Naumann. It is a continuous system—the coal being carbonized in a retort internally heated by gas generated by the plant itself, while the descending coke is gasified in a generator below. The water gas produced, along with undecomposed steam, passes through the column of coal in a highly heated state, thus promoting rapid carbonization and the evolution of the volatile products. The operations (which are described in the paper of which we give a translation in other columns), it is claimed, can be regulated to deal with any class of coal, or to produce more high-grade gas, more oil, or more ammonia. The published paper abruptly cuts off interest. It does not tell us how much gas is produced per ton of given coal; but it does tell us that, according to working conditions, the gas varies in calorific value from 210 to 370 B.Th.U. An analysis of the gas from a "good" coal, too, shows that it contains a low percentage of inert constituents; and the gas is credited with having a higher flame temperature than coal gas, and consequently with affording better utilization of its heating value in all processes requiring high temperature. Another omission is the quantity of ammonia produced; but the general statement is made that yield approaches the theoretical maximum. Particulars of the quantity and nature of the oils are also absent. Cost details are not supplied; but it is mentioned that the process is highly economical, to which general support is given by the statement that, with bituminous coal (unpriced), after deducting the receipts for tar and sulphate of ammonia, the cost works out to 2·04d. per 1000 c.ft., whether including capital charges is not divulged. However, for a gas containing 90 p.ct. of combustible constituents, this is a low cost. With such a process available, Dr. Naumann thinks the German Government should control the use of coal.

Sulphate of Ammonia Price Protest.

It is not astonishing to find the makers protesting against the prices officially fixed for sulphate of ammonia for the season 1917-18. This applies to all producers, but those in the gas industry especially have cause for complaint. Not only has there been for the industry a greatly increased and increasing cost of sulphate manufacture in respect of acid, wages, lime, bags, &c., but high prices and regulated payments hem it in from the beginning to the end of its manufacturing and commercial operations. While gas undertakings have to pay heavily in all directions, they are "sweated" at every point at which they come into contact with Government Departments. It is a curious fact that it should be so, while other industries have an immunity from regulation, from which they are richly profiting. The gas industry does not want to make undue profits; but it does want to be treated fairly. Even for cereals, prices are fixed by Government Departments at relatively high levels; but the gas industry and its fellow producers of sulphate must, it is ordained by Government Departments, supply the artificial fertilizer for the production of these cereals at a price that is inconsistent with manufacturing and other current conditions. The Sulphate of Ammonia Association has passed a mild and courteous protest (printed in other columns), and made suggestions regarding an amendment of price in consideration of the increased cost of sulphuric acid, and consultation when questions of price and other matters affecting the trade are under discussion. It is about time that some really strong and effective action was taken to bring before the authorities the view that the gas industry ought not to be expected to go on with the ill-consideration that it is now receiving. Nothing within reason will it decline to do on patriotic grounds; but it should receive—it has a right to receive—at any rate common justice at the hands of Government Departments. It is refused relief under the sliding-scale, coke exports are regulated, sulphate of ammonia exports are prohibited, the price for sulphate at home is regulated at a low figure in relation to costs, from the regulated prices of benzol and toluol some undertakings earn little or nothing, and accompanying all of this is the huge burden of an industry whose main raw material is coal, as well as the ordinary burdens of the times. We do not see the fairness of a position from which so much is expected by Government Departments, and to which so little consideration is given by them.

Relations between Employers and Employed.

Some days ago an interim report on Joint Standing Industrial Councils was submitted to the Prime Minister by a Reconstruction Committee Sub-Committee on Relations between Employers and Employed. The terms of reference to the Sub-Committee were to make and consider suggestions for securing a permanent improvement in the relations between employers and workmen, and to recommend means for securing that industrial conditions affecting these relations shall be systematically reviewed by those concerned, with a view to improving the conditions in the future. This Sub-Committee is mainly composed of prominent representatives of employers' associations and trade unions; and it is hoped that the proposals put forward, if carried into effect, will have far-reaching beneficial results. Among these proposals is the establishment for each industry of an organization, representative of employers and workpeople, to have for its object the regular consideration of matters affecting the progress and well-being of the trade from the point of view of all those engaged in it—so far as this is consistent with the general interest of the community. In order that this idea may be carried into effect, it is recommended that the Government should at once propose to the various associations of employers and employed the formation of Joint Standing Industrial Councils in different industries in which they do not already exist. It is important to note that, before deciding to adopt these proposals, the Government have invited the general views of leading employers' associations and trade unions—for the suggestions are applicable only to well-organized industries, and have for their object to deal with but one aspect of the problem of industrial reconstruction. The views of these bodies are desired promptly; and then if it is finally decided to adopt the scheme recommended by the Sub-Committee, each of the trades affected will be invited to discuss the best method of putting it into operation. At present the idea is to get from those who have been consulted merely general criticisms and suggestions on a question with regard to which the Cabinet feel that action cannot be deferred until after the war, as it is essential that the problems involved should be fully discussed by the parties before they actually arise.

Municipal Managers and Legal Recognition.

The managers of municipal gas and electric light plants in Massachusetts will plume themselves that they are deemed worthy of special notice by the Board of Gas and Electric Light Commissioners. They will at any rate be in a superior position to the managers of British municipal plants in that they will, if the legislation proposed by the Commissioners be passed, have their position recognized and defined in an Act. The Commissioners have found that a weakness divulged by experience is the insecure tenure of the office of the managers of municipal plants and the pressure which is frequently brought to bear upon them to permit or adopt practices with respect to the conduct of the business, which will in time undermine the efficiency of such plant and the integrity of the public investment therein. Therefore in a Bill which the Commissioners have drafted, it is proposed to enact that the managers of municipal gas and electricity plants shall, under the direction and control of the Mayor, selectmen, or municipal light board, have full charge of the operation and management of the plant, the manufacture and distribution of gas and electricity, the purchase of supplies, the employment of agents and servants, the method, time, price, quantity and quality of the supply, the collection of bills, and the keeping of accounts. More information on the subject will be obtained from the notice of the report in other columns; but, if managers of municipal undertakings on this side had their positions strengthened by legislative recognition in this way, there would be less disinclination on their part to a little more plain speaking to a certain element in some municipal bodies which thinks it part of its functional work to make the office of manager a bed of thorns, and to do its best to ride-down law and order upon the works.

PRESENTATION TO MR. RAYNER.

The July issue of the "Co-Partners Magazine" of the Gas Light and Coke Company reports that on Tuesday, the 19th ult., Mr. Henry Rayner, the late Secretary of the Company, visited Horseferry Road for the purpose of receiving parting gifts from the Company, the Directors personally, and from old colleagues, the Chief Officers of Departments at Westminster. It was a source of gratification to his friends to observe that Mr. Rayner looked in improved health. There was no formal ceremony; but the Managing-Director gave expression to the feelings of those who, having worked together through sunshine and storm for many years, shake hands over the retirement of one of the companionship into well-earned ease. Mr. Rayner made suitable acknowledgment of the presents; but the war-time conditions forbidding the celebration that such an event would certainly have invited in normal circumstances, the episode passed quietly into the history of the Company.

The gift of the Company was a tulip-wood canteen of cutlery and silver, bearing an inscription: "In recognition of forty-two years' devoted work." The personal gift of the Directors was a handsome silver rose-bowl, inscribed, "A mark of their sincere esteem and regard, on his retirement, after forty-two years' zealous service." The Chief Officers' present was a fitted suit case for Mr. Rayner, and a fitted dressing-bag for Mrs. Rayner. The inscription was: "From his colleagues in The Gas Light and Coke Company, as a souvenir of many years of good fellowship and friendship."

Large Gas Water-Heating Apparatus.

It is hardly astonishing, when the contents are considered, that there should have been so extensive a demand for a number of "A Thousand-and-One Uses of Gas," dealing with gas water-heating apparatus for large institutions, as to call for what is practically a reprint. This has been issued, as the July number of the publication, by the British Commercial Gas Association; and it will be found very useful in solving some of the problems arising out of the conditions of business to-day. With temporary hospitals, camps, canteens, and similar places requiring liberal supplies of hot water, springing up everywhere, no gas man can tell just when a favourable opening is likely to present itself; and so it is well to be prepared. Towards this end, the particulars given should assist. The probable requirements are explained; and there are photographs of a number of installations of different kinds, serving varying purposes. The arrangements of apparatus detailed emphasize the extensive character which the demands are liable to assume; and care is taken to point out that institution requirements are always more or less special, and cannot be calculated or gauged, to any useful extent, by comparison with domestic hot-water supplies.

CITY AND GUILDS EXAMINATION PASSES.

To the names of successful candidates in the recent City and Guilds of London Institute gas examinations given in last week's issue, there are a few to be added to-day. There must have been other successes; and we shall be glad to learn of them without delay, so as to complete publication of the names in next week's "Journal."

Gas Engineering.

Final Grade—First Class.

Joseph Sparkes, Congleton.

Grade I.—First Class.

Campbell, D. R., New Cross.

Grade I.—Second Class.

Alford, W. F., New Cross.
Harris, A. E., South Lambeth.
Sidery, A., Dulwich.

PERSONAL.

Mr. Francis Sully, of Romford, has been elected to fill the vacant seat on the Board of Directors of the Romford Gas and Coke Company, caused by the death of Mr. W. D. Child.

Mr. Robert Martin-Holland, C.B., has, it is announced, been elected a Director of the Gas Light and Coke Company, in succession to Mr. J. Douglas Walker, K.C., who has retired from the Board.

Mr. Henry Hoare, the Engineer, Manager, and Secretary of the Gisborne Gas Company, New Zealand, has now three sons serving in the New Zealand forces. Arthur Ernest and Sydney Hubert have been for over two years with the Ambulance Section at the front; while the eldest, Sydney Arthur, is now on his way there with the Light Horse Section. Messrs. John Wright & Co.'s Australasian Sales Manager, Mr. Charles R. Adamson, also has a son fighting in France with the Australian Division; and his eldest son gave up an important position to undertake munition work at Messrs. Vickers', in connection with arrangements made by the Australian Government.

Captain Edric W. Broadberry, of the 1st/7th Essex Regiment and the R.F.C., the eldest son of Mr. A. E. Broadberry, M.Inst.C.E., of Tottenham, the Immediate Past-President of the Institution of Gas Engineers, was married on Monday of last week, at St. George's, Hanover Square, to Kathleen Mary, eldest daughter of Mr. & Mrs. Samuel J. Griggs, of Dunelm, Loughton. The subsequent reception at the Langham Hotel was attended by many friends both of the bride and bridegroom. Captain Broadberry went through the fighting at Suvla Bay (Gallipoli), and afterwards saw service in Egypt and Sinai. He has recently been doing good work for the R.F.C., in France and elsewhere. In civil life, he was under Lieutenant-Colonel Harold W. Woodall at the Bournemouth Gas-Works; and, being already in the Territorials, he was mobilized immediately on the outbreak of war.

Notification has been received by Mr. J. H. Troughton, of Newmarket, that his second son, Captain Joseph E. Troughton, of the West Riding Regiment, has been severely wounded while leading his platoon into action from the trenches, and is in the Second London General Hospital at Chelsea. It is stated that a shell exploded in front of the column, and that he was struck by shrapnel. He was a pupil with Messrs. R. Dempster and Sons, of Elland, when war broke out and he joined the West Riding Regiment (Duke of Wellington's) as a private. He obtained his commission early in 1915, and previous to going to France was on active service at Suvla Bay and in Egypt. We are glad to learn that he is recovering from his serious wounds. His Commanding Officer writes: "He is the most popular officer in my battalion. He is a most competent officer. The men simply love him. Although I have only been with this battalion for a month, I have seldom found any officer who has taken to his work better; and I shall miss him very much indeed."

The position of Engineer and General Manager to the Blackburn Corporation Gas Department, rendered vacant by the death of Mr. A. Morton Fyffe, has been filled by the appointment of Mr. John W. M'Lusky, the Gas Engineer and Manager to the Airdrie Corporation. Mr. M'Lusky (who is a brother of the Halifax Corporation Gas Engineer) is 34 years of age. His first appointment was as Assistant Gas Engineer to the Renfrew Corporation; but four years later, he became Superintendent of the Barking Gas Company. Later on, after spending three years as Assistant at Bridgwater, he went to Portrush as Gas Manager, moving from there in 1915 to take up a similar position at Airdrie. His professional career has already provided him with a large experience of new works and extensions. While at Renfrew, there were put into operation a new retort-house, with railway siding and coal and coke handling plant, as well as new scrubbers, condensers, and purifiers. At Barking, there were erected a half-million cubic feet spiral holder, and electric stoking machinery and elevating plant; and at Portrush and Airdrie he has had charge of new work of a substantial character. Mr. M'Lusky's appointment to Blackburn was by a unanimous vote of the Gas Committee. The salary is £800 per annum. At the monthly meeting of the Airdrie Town Council, Provost Frew, on behalf of the Council, extended hearty congratulations to Mr. M'Lusky. While they regretted that they were losing his services, they could not, he said, stand in the way of his betterment in life; and he was sure Mr. M'Lusky would leave them with the best wishes of all. A deputation from the Blackburn Corporation visited Airdrie a week or two ago and made inquiries. Mr. M'Lusky, in his letter of resignation, mentioned that it was not without regret that he tendered it, as during the past two years the gas undertaking had achieved excellent results; and in Airdrie he had found great pleasure in his work.

OBITUARY.

BENJAMIN GREEN.

After a connection with the gas industry extending over very many years, during which he accomplished much useful work, Mr. Benjamin Green (formerly Secretary and Manager, and afterwards a Director, of the Mitcham and Wimbledon District Gas Light Company) passed away at a ripe old age last Thursday morning; and to the family keen sympathy will be extended.

Born in July, 1840, at The Delph, near Brierley Hill, Mr. Green, on leaving school at the age of sixteen, entered the service of the Brierley Hill Gas Company, to whom he became Assistant Secretary and Manager. Then ten years later—that is to say, in 1866—he went to Mitcham to take up the position of Secretary and Manager to the Gas Company, which was at that time a small private concern, without parliamentary powers, and having a capital of less than £42,000. When Mr. Green joined the Company, there were two undertakings in the district, one at Mitcham and the other at Wimbledon; but in 1877, parliamentary powers having meantime been secured and the two Companies having been amalgamated, operations were concentrated—an entirely new works being erected at Mitcham under his supervision.

Mr. Green retained his position as Chief Officer of the Company until October, 1911, when he retired, and was succeeded by his son, Mr. B. R. Green; and two months later he was elected to a seat at the Board, of which he remained a member until the amalgamation on Jan. 1, 1913, of the Company with the Wandsworth and Epsom Companies, under the title of the Wandsworth, Wimbledon, and Epsom District Gas Company. Failing health had since that time prevented him from taking any active part in the work of the industry; but he followed with very great interest all improvements and developments which took place. His relations with the staff and workmen of the Company were invariably of the most cordial character; and he was justly proud of the handsome testimonials from them of which he was on several occasions the recipient.

As to his Association work, Mr. Green was a member of the old British Association of Gas Managers (now the Institution of Gas Engineers); having been elected in 1872. He retained membership of the Institution until the date of his death; and for several years he was a member of the Committee of Management of the Benevolent Fund. In addition, he was one of the founders of the Southern District Association of Gas Engineers and Managers, of which also he remained a member until the end. Outside his work for his own undertaking, he was a Director of the Singapore Gas Company from 1892 until it was taken over by the Municipality; and he also devoted a good deal of time to parochial matters in Mitcham, as a member of the School Board and as a churchwarden.

The Manchester Corporation Gas Committee have had reported to them the death of Mr. Thomas Harrison, late Chief Deposits Clerk, who was in their service for 54 years.

Gas for Shoemaking.

The prominent place that may be occupied by gas in the manufacture of shoes is shown in an article by Mr. S. S. Amdursky, of the Rochester (U.S.A.) Railway and Light Company, who describes the various processes. Among these, a gas-fired steam-generator furnishes heat for a wax bath, &c., and a water-heater is used for tempering the sole material; while various tools for treating the welt and sole edge are heated by an open gas-flame. Then there is an illustration of a gas-fired air-drier, designed by the Rochester Company to remove (preparatory to sand papering) any moisture which might be left in the sole of the shoe. This drier consists of a galvanized box, having a screen cover; the whole being supported by an angle iron construction. The heater consists of two headers, branch-pipes from which lead into the flue. A burner-tube runs along inside each header, and has as many flames as there are branches—each flame with direct access into each branch. Baffle-plates direct the flow of the heated air uniformly. This particular drier replaced a steam-heated one; and it is found that, owing to the regular temperatures, the shoes taken from the gas-heated drier are in a much better condition and shape for sand papering than with the steam-heated drier. Also, while the speed of the operation is practically doubled, the heat may be controlled at will. The products of combustion do not come in contact with the shoes; and the design is such that one-half only of the drier may be used, if desired. The moment the drier is not required, of course, the gas is shut off, and the fuel cost ceases.

INSTITUTION OF GAS ENGINEERS.

A Special General Meeting.

On Thursday afternoon last, a Special General Meeting of the Institution was held at the Institution of Civil Engineers, Great George Street, S.W., for the purpose of submitting for confirmation an alteration to the Articles of Association which was passed at the annual meeting last month, and to elect two honorary members. Mr. Samuel Glover, of St. Helens, occupied the chair, in the absence of the Rt. Hon. Lord Moulton, K.C.B., F.R.S. (the President).

An Alteration in the Articles.

The Chairman explained that it was a formal meeting of the Institution, called by a notice which had been sent out to the members; and, in the absence of Lord Moulton, the President, he had been asked to take the chair. The first item of business was the alteration to the Articles of Association; and he thought their minds were clear as to the purport of the amendment. The Council were anxious that there should be no doubt whatever as to why the alteration was sought to be made.

Mr. A. E. Broadberry (Tottenham) said it was his pleasure and privilege to propose that the alteration to Article of Association 50 (*f*) be confirmed. They would remember that the alteration, which was as follows, was passed at the annual meeting on June 5:

> "That the last sentence of Article of Association 50 (*f*) be deleted and the following words substituted: 'or any other person interested in the gas industry who may be elected to such Committee by the Council of the Institution.'"

The object of the alteration was a very simple one. They all of them knew that at the present time it was desirable that they should be in a position to re-constitute the government of the industry; and, with this end in view, it was necessary that they should invite others who were not members of the Institution to confer with them. But although under the existing Articles of Association they could ask them to come to a meeting, they would have no power to vote at the meeting—which would place them in a somewhat invidious position. The Council wanted to do away with every possible cause of friction; for it was desired that any alteration which might take place in the constitution of the Institution itself and the general government of the industry should be carried out with the utmost harmony. ["Hear, hear."] Therefore the idea of the suggested alteration was that those gentlemen who, not being members of the Institution, might be asked to join any Sub-Committee to confer on any subject of general interest, should not only have the right to attend a meeting to which they were invited, but should also have the power of voting at the meeting. Everybody would, he was sure, agree that at the present moment, when there were such great possibilities in front of the industry, it was necessary that every practicable step should be taken to create a combined body that was perfectly harmonious; and this was the first step towards so desirable an end. He had, therefore, much pleasure in proposing the confirmation of the resolution which had already been passed.

Mr. John Young (Hull) said he had very much pleasure in seconding the motion. The proposed alteration was carefully considered at the annual meeting, and approved, and had now been ably explained by Mr. Broadberry. It was, he felt sure, a step in the right direction.

Mr. C. E. Jones (London) remarked that, as a member of the Institution under its various names for 43 years, he rose to support the motion. It would be within the recollection of some of them, but not of all, that about 33 years ago the Institution adopted a policy of exclusiveness, and reorganized itself on lines which he, and friends of his, then opposed. They brought about some modification of the arrangement; but they did not succeed altogether in keeping the portals of the Institution open to all those of scientific attainments and otherwise interested in the Institution. This policy, he was proud to say, was now upon its death-bed, and was about to be altered. A more disastrous thing for the gas industry, with its manifold ramifications, than was carried out at that time, he could not imagine; and he rejoiced that he had lived to see the day when the commonsense of the Institution had prevailed, and they were going back to the safer and much more liberal lines of the old organization. The policy of restricting the Institution to certain members, whatever their qualifications might be, so long as they held the requisite position in a gas-works, had shown the difficulty of drawing hard-and-fast lines, and making cast-iron rules, to keep out everybody except those who happened to be in charge of gas-works. They had among them men of considerable ability, and they had scientists of unquestionable honour. Many of them, fortunately for this country, were engaged in trade; but unfortunately for themselves, the Institution had said: "You are a trader, and so you cannot enter our portals." This was a thorough mistake. It was quite inimical to the true interests of the gas industry and to the advancement of science all over the world. With a united industry, all striving for one great object, there was a large area awaiting investigation. There was a very wide field indeed waiting for cultivation. Some fifty or sixty years ago, the science of chemistry was in a dormant state, when suddenly the enormous facilities afforded by the gas industry rejuvenated the science of chemistry. Even to-day it was but partially developed; and its field was in the industry to which those present had the honour to belong. They had taught the whole world how to array itself in beautiful colours. This was due to the gas industry. They had also enlightened the ways of the world. This was due to the gas industry. And they would have made still greater progress if they had not been hampered by the jealousy of the governing bodies, and in some instances by the shortsightedness of their own governing body. But for this, they would have occupied a still higher position to-day than they did. He therefore rejoiced that they were now in a position to congratulate themselves upon emerging from the cast-iron rules that were imposed upon them over thirty years ago. He felt sure he was only echoing the views of his friends and the Institution generally in expressing the hope that, under such an illustrious President as they now had the honour to serve, they would see an immense stride forward taken. In the various branches of science there was much for them to do; and he was perfectly satisfied they were moving in the right direction by carrying this resolution and abolishing the exclusiveness to which he had alluded. He therefore supported most warmly the resolution before the meeting.

The Chairman said that if the proposal needed any further support, it could be given by those of them who had been identified with the work of the Council. In many cases they had co-opted men, who came and worked on a Committee; and it had been found that they felt their position was less dignified than it ought to have been. When this resolution was passed—as he had no doubt it would be—it would prevent them from being in the position that they could invite people to come to committee meetings, and yet could not ask them to join in the voting on the question they might be discussing.

The resolution was then carried unanimously.

Sub-section (*f*) of Article 50 will now read that the Council may

> Appoint Special Committees for investigation into matters connected with the manufacture and application of gas, or otherwise for special purposes in furtherance of the objects of the Institution. They may delegate to such Committees such of their powers as they shall think fit; but such Committees shall be subject to their control, and shall not expend any funds of the Institution other than such as have been voted for their use by the Council. Such Committees shall consist of persons on the register or list of the Institution, any such person, whether a member of the Council or not, being eligible, or any other person interested in the gas industry who may be elected to such Committee by the Council of the Institution.

Two New Honorary Members.

The Chairman said there was another item of business to put before the members. When he first received the notice of meeting, and read that they were to have the President with them that afternoon, he was delighted; but unfortunately Lord Moulton was not able to be present to propose the next resolution, though he had promised to meet the Council afterwards. He (the Chairman) had therefore to propose the election as honorary members of the Institution of the two gentlemen whose names had been put before them. The Council unanimously supported the proposal. They were convinced they were doing the right thing—honouring themselves as an Institution, while at the same time giving honour, so far as they could, to those whom they were inviting to become honorary members. The first name was that of Dr. Frederick Mollwo Perkin, F.I.C., son of the late Dr. Perkin, who was the inventor of that wonderful series of dyes of which Mr. Jones had just reminded them. The other was Mr. D. Milne Watson, M.A., LL.B., the Managing-Director of the Gas Light and Coke Company, who was known to all of them, and respected for his good work in the interests of the industry. These gentlemen had felt it an honour to be invited to become honorary members of the Institution of Gas Engineers; and he therefore had much pleasure in proposing that the action of the Council in bringing their names forward be confirmed.

Mr. Thomas Berridge, in seconding, remarked that both gentlemen were well known, and had done the Institution an honour, which the members would fully appreciate, by their acceptance of the invitation extended to them.

The resolution was unanimously agreed to.

Certification of Gas Undertakings.

The Chairman then read the following letter from the National Gas Council on the subject of the certification of gas undertakings.

[The letter had reference to the resolution unanimously passed at the annual meeting of the Institution, requesting the "Committee of the National Gas Council charged with the question of labour in gas-works to urge the Dilution Department of the Ministry of Munitions to apply the schedule of protected occupations to all gas undertakings." It was written in response to an application by Mr. Walter T. Dunn, the Secretary of the Institution, for the latest information available on the subject.]

Certification of Gas Undertakings.

Sir,—I beg to inform you that this question has been referred to the Ministry of Munitions, who have advised the Council that it is a matter for decision by the War Cabinet. Up to the time of writing, no ruling has been announced.

From information before the Council it is clear that many gas

undertakings are receiving protection cards for their employees though not certified; and they are thus placed in a similar position to certified undertakings, and will be dealt with at the discretion of the Dilution Officer of the Munitions Area.

The difference between the red and black cards appears to be very slight, both being subject to withdrawal at short notice.

(Signed) W. J. SMITH,
July 4, 1917. Secretary to the National Gas Council.

This was followed by an informal discussion, which brought the proceedings to a close.

OPERATING CARBURETTED WATER-GAS PLANTS FOR THE PRODUCTION OF BLUE WATER GAS.

IN view of the present interest in the use of carburetted water-gas plants for the manufacture of blue water gas, the following notes have been compiled and are issued by the Council of the Institution of Gas Enginners.

Up to the present time, practically all water-gas plants in gas-works in the United Kingdom have been operated for the production of carburetted gas; but every such plant is primarily a blue-water-gas generator, and can be operated without any structural alteration for blue-water-gas alone. It requires only a re-adjustment of generating conditions—*i.e.*, principally in the rate and the period of blasting and steaming, and the height and the character of the fuel bed.

As heat is not required in the carburetting chambers when oil is not being used, the object to aim at for economical working is to minimize the waste of heat due to the volume of CO, and the quantity of sensible heat in the blast products. This requires, in practice, slow steaming and quick blowing; and this is effectively accomplished by altering the timing of the cycle.

The general character of the fuel—as to hardness, content of ash and moisture, &c.—has an important bearing on the working results of all plants; but as a rule, the cycle which gave the best results in working for carburetted water-gas production should not be too radically altered when starting blue-water-gas production. To begin with, the adoption of a somewhat shorter cycle, with the fuel depth unaltered, is the best step to take. For example, if the customary cycle for carburetted gas has been (say) three-minute "blows" and five-minute "runs" a trial with two-minute "blows" and five-minute "runs" is advisable—keeping the CO_2 content in the finished blue gas below 6 p.ct. The CO_2, if too high, may be reduced by cutting-down the steam, or the length of the steaming period, or by a longer or stronger blast. The resultant fuel consumption is a good guide for any further adjustment which may be found necessary.

It is always important to use in the generator coke of suitable size, in as dry a condition as possible, and free from dust and breeze.

The analysis of blue water gas is approximately as follows:

Hydrogen	50·5
CO	38·5
CO_2	6·0
N	3·5
CH_4	1·0
H_2S	0·5
	100·0

The calorific value is about 300 B.Th.U. gross.

In considering the admixture of blue water gas with coal gas, it is essential to have regard to the diminution of calorific value of the mixture. In many cases, it will be found necessary to increase the calorific value of the coal gas, which for an admixture of 20 p.ct. of blue water gas (*e.g.*, 80 p.ct., of coal gas, 20 p.ct. of blue water gas) should not be lower than 540 B.Th.U. The blue water gas, with not exceeding 6 p.ct. of CO_2, should be about 300 B.Th.U. The calorific value of the mixture will thus be a little over 490 B.Th.U.

In respect to the distribution of the mixture, it is of the highest importance that the percentage and qualities of the mixed gases be maintained as constant as possible, and any changes in the proportion should be made gradually.

In carrying out the above suggestion, should any difficulty arise which cannot be accounted for, it would be advisable to bring the matter to the attention of the makers of the plant.

Restrictions Regarding Machine Tools.—The Minister of Munitions calls attention to the fact that, under the Defence of the Realm Acts and Regulations, no person is allowed to sell, purchase, hire, or loan, or send on approval, any new or second-hand machine tools, without the permission in writing of the Ministry of Munitions. Applications from intending purchasers should be addressed to the executive officers of the Area Clearing Houses, the addresses of which can be obtained by application to the Central Clearing House, Charing Cross Building, London, W.C. 2. Applications for permission to sell should be addressed to the Machine Tool Department, Charing Cross Building, Villiers Street, Strand, W.C. 2.

ELECTRICITY SUPPLY MEMORANDA.

THE view changes in connection with the Electric Power Supply Committee. It has been doing so weekly since the appointment by the Board of Trade; and even those annotators on electrical events who at first saw the opening of the high road to electric salvation at the portals of the Board of Trade are dropping into line with those who detected in the constitution of the Committee something defective, and with those who now fancy the Committee is something in the nature of a trap—the divined object being the wholesale annihilation of numerous municipal undertakings and the scooping of their interests and affairs into a few new octopus-like creations. It is not fashionable these days to side with autocratic bodies or movements; and electricians are looking very suspiciously upon the proceedings of such an embodiment of absolutism as the Board of Trade, who, it appears they have rarely known to do good save by accident. As was announced last week, the result of the press and local authority agitation over the composition of the Committee has been to move the Board of Trade to concede three additional representatives to the municipalities. But there came another rude shock The municipal side of the electrical industry is very anxious to have men who can throw weight into the balance against the electrical experts already upon the Committee. The Board when seeking to get nominations from the Municipal Corporations Association, the Urban District Councils Association, and the Incorporated Municipal Electrical Association, ventured to suggest that their nominees should not be engineers. The Association of Municipal Corporations went and at once put forward the name of Mr. Harold Dickinson, the City Electrical Engineer of Liverpool. The upshot is that the Board of Trade have added to the Committee Mr. W. B. Smith, of Glasgow, Mr. Dickinson, and Mr. E. F. Vesey Knox, K.C. They have also secured Sir Archibald Williamson, Bart., M.P., as Chairman, in place of the Right Hon. F. Huth Jackson, who resigned on medical grounds. What the municipal authorities are still fearing is that the constitution of the Committee means a confiscation of some of their rights and privileges, and the furtherance of the large concentration policy. In other words, there is a sort of plot hatching to push them out, and to bring the whole electrical supply of the country under the domination of large companies—leaving possibly the local authorities to be nothing more than distributors and salesmen. Not many days ago, electrical generating concentrations on the large scale were the one thing needed. But to-day it is seen that it makes all the difference who is going to govern the concentrations. The municipal authorities at the present time control a very large part of the electricity supply industry; and, providing there is no change in general legislation, they would (if desired) ultimately come into possession of the whole of the company undertakings. They feel they are now to be put on their trial. The very fact that the inquiry is into the question of the provision of cheaper electrical energy is in effect an indictment of their management and of the system under which they operate; for obviously it is the opinion of the Board of Trade that the local authorities have not succeeded in five-and-thirty years' development in providing electrical energy at the price at which it is needed. Meanwhile, in so far as there is any manifestation, the electrical companies are sitting watching the play, without taking any part in it.

Dark Designs.

No Definite Policy.

But there is no doubt they are quietly preparing themselves for the inquiry; and when wanted they will be there, and fully armed. We learn that the Municipal Corporations Association the Municipal Electrical Association, the Urban District Councils Association, the Institution of Electrical Engineers, and the Association of Electric Power Companies, as well as commercial organizations, are preparing to give evidence; and the British Empire Producers' Association are at present collecting information from the industrial side. This organization has already submitted to the Committee that "the class whose views are deserving of prior consideration consists of the manufacturers throughout the kingdom, whose business is likely to be affected, particularly with international competition after the war, by the efficiency and cheapness or otherwise of electric power distribution. . . . The industries of the country will not be able in the coming period of international competition to afford the continuance of such handicaps as excessive charges for power." The Special Committee of the National Gas Council who are watching current developments as they affect the gas industry will note this expression of opinion, and probably meditate upon, and take action in regard to, the part that the gas industry can or should take to meet the requirements of industry. We seem in the gas industry to be as badly off for a well-defined policy as the electricity industry—if not more so. However, the Committee will doubtless hear that the manufacturers of the country have the very virtuous and human desire to get power for their works as cheaply as possible; and the Committee will possibly hear all sorts of untried schemes propounded whereby the generation and distribution of energy can be carried on at a cheaper rate than now; and, from the medley of view, they will draw their own conclusions, which it will not be surprising may be those already

held by the strongest electrical men on the Committee. Mr. T. Roles, of Bradford, sees the electricity industry floating aimlessly on the tide of current events; and at the recent meeting of the Incorporated Municipal Electrical Association, he—shrewd observer that he is—appealed for the formulation of a definite policy. The "Electrical Review" endorses Mr. Roles' appeal in an article headed "Wanted, a Policy." But for the life of us we are not at all clear (after reading it) to whom the "Review" would, if it had its way, confide the provision of the cheaper electricity—whether to municipalities or companies. It certainly is not to the latter, because our contemporary says: "It may be many years before the latter [the companies] will find in cheaper electricity supply a source of dividends. Nevertheless, cheap electricity is a need of the hour, and 'for all' should be the motto of the supply industry of the country." But after all what is "cheap electricity supply"? Cheapness must not assail sound business principles, and it must not be obtained by following the rascally process at present pursued by a number of local authority electrical undertakings of making the ratepayers generally pay part of the cost of providing the electricity requirements of a section only of the ratepayers. On the other hand, the cheapest electricity supply is not to be obtained by making profits for the relief of the rates. The gas industry could furnish, if the electricity industry desires it for the Committee, some information as to the development of this vicious practice, which is only nascent in the electrical industry, but is very full-blown in the gas industry. If, as a result of the Committee's investigation regarding the influences operating for and against cheap supply, such things are no longer tolerated in municipal electrical trading, then they must not be in the case of municipal trading in gas supply.

Hackney Dissatisfied.

According to Mr. L. Robinson, the Borough Electrical Engineer of Hackney, the preferential charges case which the Gas Light and Coke Company have invited his Council to settle with them in the Law Courts is likely to come on for hearing this month. The event has taken long enough to be brought to a head; but it has given the Hackney Electricity Department and their friends more time to tout for contributions to the costs of the defence. Some £1000 has been promised; but Hackney is far from satisfied. Mr. Robinson refers to it as "meagre support;" and in his resentment, he charges the municipalities of the country with want of cohesion. That is too bad. What he calls "want of cohesion" in this particular matter may be due to prudence, or it may be that other municipalities have their own views as to whether certain procedure is actually breaking the law. Mr. Robinson must allow other men to have a point of view different from his own, and to act accordingly. The Local Government Board, too, refuse to sanction such expenditure, and prefer to leave the matter to the District Auditors, when the accounts come up for their investigation. There are visions of surcharges in some quarters. However, there was another attempt to whip-up the unsympathetic and the laggards at the meeting of the Municipal Electrical Association. The Council stated in their report that they consider the Hackney people have a very good case. In their wisdom, they thought so, too, in regard to Ilford; but legal authorities higher than the Council of the Association ruled otherwise. Despite this declaration of opinion, and the appeal of Mr. Robinson, we have not heard of the letter-box at the Hackney electricity offices bursting with the rush of subscriptions from contrite local authorities.

To Cheapen Electric-Cookers.

The question of the standardization of the electric-cooker is again to the front—the National Electric Light Association of America having brought it there. The electrical people have come to the conclusion that they have quite enough to contend with in the low thermal value of a unit of electricity without having expensive appliances to act as a drag upon the business, with the heavy expenses for maintenance and expert attention. They find that the old shrinkage-of-meat fable and all the other supposed superior virtues of electricity are not sufficient to persuade people to transfer their custom; while the gas industry have a pretty good pack of experience of householders who have considered they have been foolish in giving credence to the various electrical tales. [By the way, we have it from one who knows something about catering that during the recent hot weather undercooked meat suffered deterioration, and became unfit for human consumption, much quicker than well-cooked meat.] The direction of view to-day is shown well by one of the most sensible points we have seen on this subject in the "Electrical Review." It says: "It is obvious that complete success will not result until electric cooking is regarded as an essential and familiar feature of the home. To the instructive requirement of cooking service, so successfully fostered by the gas industry in this country, must be added a preference for electric cooking service, which must be made available on similarly easy terms." That is one of the goals. It shows an enlightened appreciation of the facts of the position. It indicates, too, what a long way the electrical industry has to go. One way in which the American Sub-Committee on Electric Range Standardization proposes to cheapen the electric-cooker is by standardization and a reduced number of models; and another way is to dispense with all superfluous parts, which have been so strongly advocated here to save wasteful use and (as far as possible) difficulty. The recommendations comprise two fundamental types: (1) A cabinet range, with canopy, three boiling-plates, an oven at right or left, and a warming closet; and (2) a flat-top cooker with a minimum of two boiling-plates (33 in. above the floor-level), and an oven below. The writer of "Cooking and Heating Notes" in the "Electrical Times" regards the latter as objectionable, because the oven is at too low a level, "which is neither convenient nor desirable from the user's point of view, and is merely a survival of the gas-cooker." Apparently he would prefer the oven mounted on legs, under which circumstance we would suggest that he should gain a little experience as to lifting heavy saucepans from the higher top, to settle the question of convenience and desirability from the user's point of view. Proceeding, we read that the Sub-Committee proposes three sizes of oven, the smallest to measure 18 in. × 12 in. × 12 in., and the largest 18 in. × 18 in. × 14 in. Grills should be rated at 1800 watts, and should have a working area 12 in. square. A built-in terminal box is not considered as an essential—only adding to the manufacturing cost. Separate fusing of boiling-plates is advocated, but pilot lamps are not regarded as necessary. A socket should be provided on the range, from which the user can supply portable devices—such as coffee percolators, toasters, or irons. Switches for cookers should be standardized; and the labels on the indicating dials should read "High," "Medium," "Low," and "Off," the "Off" being different from the running indications. Separate heaters for the warming closet can be avoided by placing it against the oven. These are among the principal methods by which the American Sub-Committee contemplates making electric cooking available and popular.

Comparative Costs of Electric and Gas Cookers.

But can electricians ever get the costs of manufacturing electric-cookers down to those of gas-cookers? It is evident the Hughes Electric Heating Company of Chicago, do not think so; for they find the work and materials involved are incomparable. This Company (according to the "Electrical Times"), in announcing a further addition to their list prices, state that within the past year labour costs have risen by 32 p.ct., the price of resistance wire by 150 p.ct., the value of porcelain bricks by 150 p.ct., and that of steel by no less than 350 p.ct. The Company also point out the reasons for the greater cost of an electric-cooker compared with a gas-cooker. In an electric cooker there is all the material that is found on a gas-range with the exception of the burners and taps. In addition, however, boiling-plates on a Hughes cooker cost £4 15s., oven elements are listed at 50s., switches cost 40s., fuses are worth 12s. 6d., and connecting wires, terminals, insulation, and so forth are provided to the value of between £2 and £3. In a Hughes oven element there are 198 parts and 172 electric spot welds, while each element passes through the hands of nineteen skilled workmen. Not only does the electric-cooker require more than twice as much equipment as that carried by a gas-range, but the labour engaged upon its construction is "paid for at a much higher rate." "The relative costs of an electric and a gas cooker cannot be compared any more than can the respective prices of a motor car and a pony trap." This is a candid confession; and it shows that, whatever is done, electric-ovens can never hope to reach the low costs of gas-cookers. And a pennyworth of half-a-crown gas will give nearly five times the thermal value of a unit of electricity!

The Contradictions of Experience.

It is really marvellous how the gas industry makes any progress at all, seeing that electrical assertion has it that every utilization of gas is so wonderfully inferior to electricity. We often smile at the queer confidence of writers on electric cooking and heating topics, at their contradictions of experience, and at their belief in the swallowing capacity of their readers. Not long ago we read that gas-heated devices are "unpracticable and dangerous—even in a marquee." This is strange seeing that gas is often run to temporary places for the purpose of providing heat for cooking or tea making. Of course, electricity offers "a ready solution" for such work. Not long ago we saw recognition made of the fact that gas-heaters and coke-boilers are used for hot water supply, but it was alleged that "they are costly to run, and have many disadvantages to which users will testify—such as smell, dirt, and fire risk." Do these allegations explain why gas and coke heated boilers are so popular, and number their patrons by hundreds where electric water heating can number its patrons by ones and perhaps by cyphers? At the time war broke out, manufacturers were being rushed for gas water-heaters, and gas companies and municipal gas departments had not the fitters with which to keep pace with demand. Yet the electrical man declares they are costly to run, and have many disadvantages! Poor fellow! We will undertake, if the person who deals out such absurdity cares to be a sportsman, to beat him in cost and time at water heating—he using electricity, we gas, and without the described disadvantages. As to fire risk, only the other week we had been reading of fires that have recently occurred through electrical agency, and curiously a few minutes afterwards stepped into an "A.B.C." shop the door of which had been receiving unmerciful attention at the hands of the representative of the Metropolitan Fire Brigade. Inquiry disclosed a wire fusion.

THE HYDRAULIC REGULATOR CONTROLLING STEAM-DRIVEN EXHAUSTER ENGINES.

By E. Davies, of Birmingham.

That the hydraulic regulator has proved a boon to exhauster engine-men in obviating the continuous manipulation of the steam-valves, and also to gas engineers in maintaining an even vacuum, is an established fact. It is, however, such a sensitive piece of mechanism that a few observations on the various points affecting its successful working may be of general interest; for when the regulator gets oscillating, it is a source of trouble in both the exhauster-house and retort-house, as the exhauster is running dead-slow one moment and racing the next, and instead of the two or three tenths of an inch maximum vacuum range that the makers claim for it, the register chart will be found to be blurred from 1 in. to 1½ in. range, as if painted with a brush.

It has been proved in some works that when working in conjunction with retort-house governors, a reaction is set up—the slightest dancing of the latter causing a pronounced oscillation of the regulator bell-float, and cases have occurred where gas undertakings have, on account of this, had to discard either the one or the other.

Should the chart commence to show a gradual incline or a series of steps, it may be taken for granted that the bell-float in the enclosed tank of the regulater has become water-logged—probably by a number of pin-hole corrosions on the water-line. In some instances this has been overcome by painting the block-tin float with a good bitumastic paint, or by making a new bell of galvanized material. But if the regulator be re-sealed periodically, there is less liability of the water becoming putrid and causing corrosion. The re-sealing is an act requiring patience, as any surplus water above the working level has to be allowed to dribble through the overflow before putting the regulator to work again—the engine-man controlling by hand while this is being done, unless another regulator is available.

Although the regulator can be controlled direct on the exhauster inlet, the ideal method is by a pipe connected to the foul main in the retort-house; and if this latter building is at a considerable distance from the exhauster-house, the pipe should be of ample area and be provided with fall and syphon pots to prevent condensation causing water-logging. It is advisable to occasionally examine the connection into the retort-house foul main, as it is very apt to get choked there. At gas-works where air-compressors are installed, it is a good plan to make use of a spare length of flexible air-hose pipe, and blow the vacuum pipe through when the regulator appears to be working sluggishly.

The stand-pipe actuating the bell-float should have a U seal or water drain attached at its base under the exhauster-house floor, to release any water getting over and to prevent any liquid getting into the vacuum control pipe.

It is absolutely essential that the lever bosses, fulcrum stud, faces of washers, and all mechanical working parts should be kept well lubricated and in true alignment, as the least stiffness of any of these renders the regulator inoperative.

The makers' instructions regarding the lengthening or shortening of the union-screw rod when more retorts are being put to work or let down require to be carefully observed.

Another cause of stiffness of working may be due to the gland packing of the steam throttle-valve; and graphite lead fibre packing has proved to be the most suitable for minimizing the friction. The steam throttle plug also may become scored longitudinally and requires periodical inspection.

In large works, where two or more retort-houses may be charging simultaneously, it has been found more advantageous for the regulator controlling efficiently to alternate the charging—especially when all the retort-houses connections branch into one trunk main.

The air escapement cock, placed in the cover of the sealed tank, plays an important part in the successful working of the regulator; and it is necessary to adjust it to a suitable position, which varies in different works.

Sudden fluctuations in the steam-pressure upset the maintenance of an even vacuum; and the hydraulic regulator works much more satisfactorily if a steam-reducing valve, set slightly below the known minimum boiler pressure, is placed on the steam-admission side of the exhaust plant.

The loose adjustable collar on the rod of the bell-float is to prevent the bell grounding on the tank bottom; but it should be set so as to always allow the throttle-valve to pass sufficient steam to keep the engine moving when the collar comes in contact with the tank cover.

The adjustable screw in the tank cover is to prevent the float rising too high; but neither this nor the above-mentioned loose collar should be used for curtailing the travel of the float to any great extent, as it will merely rob the regulator of freedom of action, and provide a sure source of oscillation.

Calorific Standard Application and Order.—The Board of Trade have received an application from the Redditch Gas Company for a calorific standard of 500 B.Th.U.; and they have made the Order asked for by the Guildford Gas Light and Coke Company.

COAL TRANSPORT AND DISTRIBUTION BY RAIL.

Official Details of Coal Controller's New Scheme.

[See Areas Map, Explanatory Notes, and List of Areas Counties on pp. 64-66.]

When Mr. Guy Calthrop addressed the Institution of Gas Engineers on June 6 [see "Journal" June 12, p. 500], he hinted that a scheme for the distribution of coal in a way that would conserve transport facilities to a very large extent was being evolved. This scheme, estimated to save no less than 700 million ton miles annually in the transport of coal by railway, has now been promulgated.

There is no need to emphasize the point that the war is largely one of transport, yet while by no means overlooking the fact that transport on the various fighting fronts is of first importance, it would be a great mistake if it were thought that the transport in Great Britain is not also of the utmost importance. Munitions of war and food have to be transported at home. Hence the imperative necessity for doing everything possible to assist in carrying out the new scheme of the Coal Controller, which is based on the principle of utilizing coal to the largest possible extent near to its place of origin, and so avoiding overlapping in the distribution of it, which, of necessity, goes hand in hand with much useless transport.

Before giving the precise details of the scheme, it may be stated that it aims at dealing solely with what is known as long-hauled traffic; but later on, when the interests affected have been adequately dealt with, it is hoped to extend the same principle and the same operations to short-hauled traffic.

Scheme of Producing and Consuming Areas.

Under the scheme, Great Britain has been divided up into twenty areas, some of which, as is seen from the schedule given below, are purely coal-producing areas, while a few are coal-consuming areas.

Area of Production.	Areas to which the forwarding of Coal by Public Railway for Inland Consumption is confined under the Coal Controller's Scheme.		
	Steam and Manufacturing.	Gas and Coking.	House.
No.	Area No.	Area No.	Area No.
1. Northumberland	1, 2, 3	1	1, 2
2. Cumberland	2	2	2
3. Durham	2, 3	2, 3	2, 3
4. Lancashire	4, 6	4	4
5. Yorkshire	3, 4, 5, 7, 8, 10, 11, 14, 16	4, 5, 7, 8, 10, 11, 13, 14, 16	4, 5, 7, 8, 10, 11, 14, 16
6. North Wales	6	6	6
7. North Stafford	6, 7, 9	7, 9, 10	6, 7, 9
8. Eastern Counties.	—	—	—
9. Shropshire	9, 12, 13	9, 13	9, 12, 13
10. Birmingham and District	9, 10, 11, 13, 14	—	9, 10, 11, 13, 14
11. Northants to Essex	—	—	—
12. South Wales and Monmouthshire	12, 13, 14	12	12, 13
13. South-Western Counties	13	13	13
14. South-Eastern Counties and London	14	14	14
15. Derby and Nottingham.	4, 6, 7, 8, 10, 11, 13, 14, 15, 16	4, 7, 8, 10, 11, 14, 15, 16	4, 6, 7, 8, 11, 14, 15, 16
16. Leicester	10, 11, 14, 16	—	10, 11, 14, 16
Scotland.			
17. South-Eastern	17	17	17
18. North-Western	18	18	18
19. North-Eastern	17, 18, 19	19	17, 18, 19
20. South-Western	18, 20	20	20

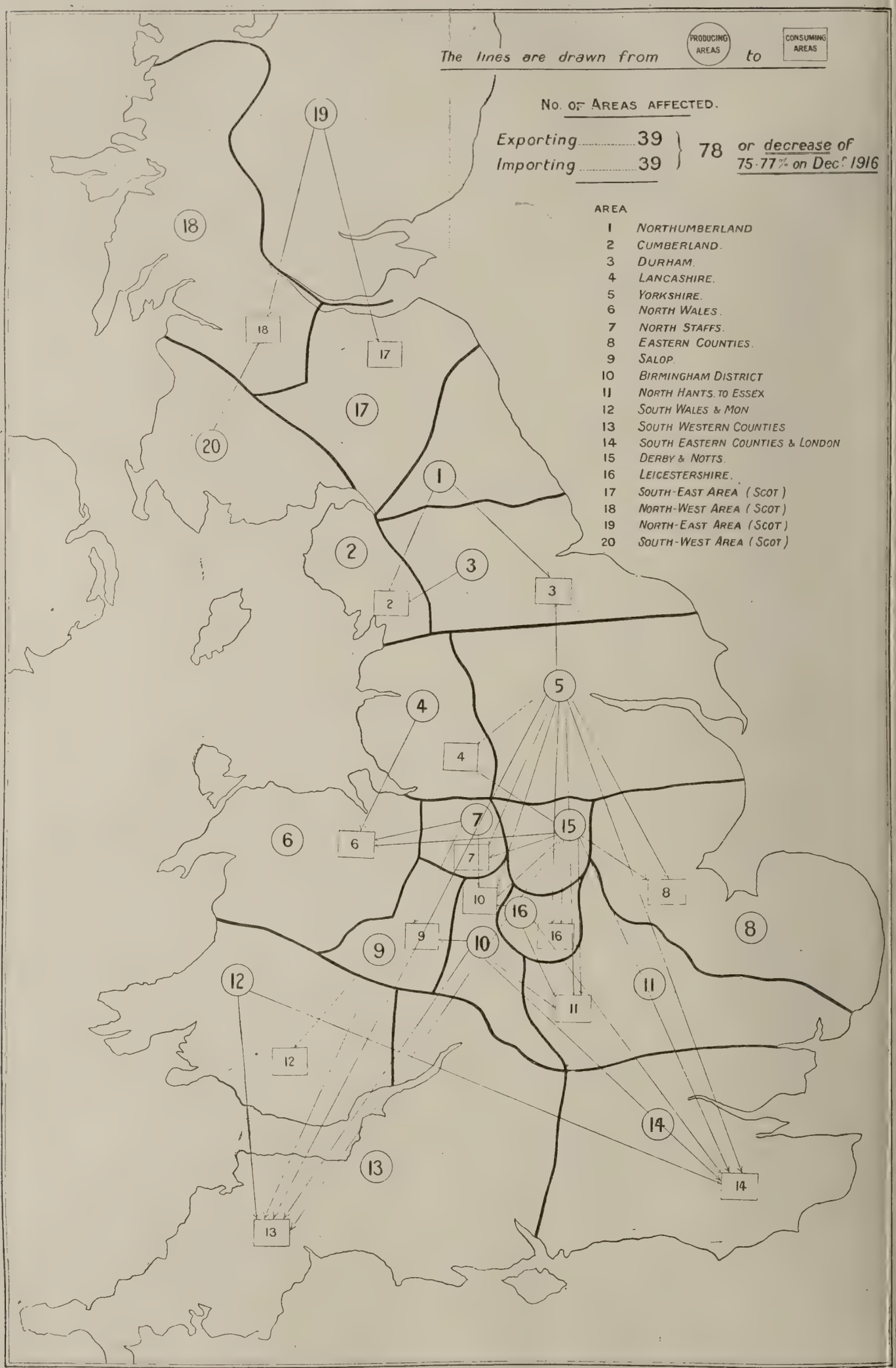
The movement of coal inside the twenty individual areas, or coal produced and consumed in the same area, remains undisturbed, and contracts will not require to be cancelled. It will be observed that the scheme bears chiefly upon coal which is being conveyed for long distances or cross-country journeys; both circumstances being prolific sources of trouble in view of depleted railway staff and rolling stock of all kinds.

Principles Governing the Scheme.

The object of the scheme being to reduce the long haul, it is based on four main issues:

(1) That the consumption of coal should take place as near the producing point as possible.
(2) That, in view of the superior facilities afforded by the main trunk lines, the movement of traffic should follow these routes wherever possible.
(3) That the movement of coal should, as far as possible, be in well-defined directions—viz., North to South, North to South-East, North to South-West, and East to West.
(4) That an area producing less coal than suffices for its own needs should not send any portion of its output to other

[Continued on p. 66.]



SKETCH MAP SHOWING INTERCHANGES BETWEEN PRODUCING AND CONSUMING AREAS OF RAILBORNE COAL (EXCLUDING ANTHRACITE) FOR INLAND USE UNDER THE COAL TRANSPORT REORGANIZATION SCHEME.

[Prepared and Published by the Railway Clearing House for the Board of Trade—Controller of Mines.]

LIST OF DISTRICT COAL AND COKE SUPPLIES COMMITTEES RESPONSIBLE FOR THE VARIOUS AREAS.

Area.	Secretary of District Coal and Coke Supplies Committees.
No. 1 (Northumberland)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
,, 2 (Cumberland)	T. P. Martin, Esq., 19, Falcon Street, Workington.
,, 3 (Durham)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
,, 4 (Lancashire)	Sir T. R. Ratcliffe Ellis, 18, King Street, Wigan.
,, 5 (Yorkshire) South Yorks. Collieries	Messrs. Parker, Rhodes, & Co., 14, Moorgate St., Rotherham.
West Yorks. Collieries	A. B. Smith, Esq., Central Bank Chambers, Leeds.
,, 6 (North Wales)	W. H. Haswell, Esq., Elwy House, King Street, Wrexham.
,, 7 (North Stafford)	Major J. Selby Gardner, Cannock, Stafford.
,, 8 (Eastern Counties)	W. Saunders, Esq., Bank Chambers, London Road, Derby.
,, 9 (Shropshire)	Major J. Selby Gardner, Cannock, Stafford.
,, 10 (Birmingham and District)	do.
,, 11 (Northants to Essex)	W. Saunders, Esq., Bank Chambers, London Road, Derby.
,, 12 (South Wales)	Finlay A. Gibson, Esq., Park Place, Cardiff.
,, 13 (South-Western Counties)	J. G. Dennehy, Esq., Albion Chambers, Bristol.
,, 14 (South Eastern Counties and London)	W. Saunders, Esq., Bank Chambers, London Road, Derby.
,, 15 (Notts. and Derby)	do.
,, 16 (Leicester)	do.
Scotland: ,, 17 (South-Eastern Counties) ,, 18 (North-Western Counties) ,, 19 (North-Eastern Counties) ,, 20 (South-Western Counties)	R. Baird, Esq., 105, St. Vincent Street, Glasgow.

THE PLACES NAMED BELOW ARE JUST WITHIN THE BORDERS OF THE RESPECTIVE AREAS.

Area (1). *Northumberland.*—Berwick, Velvet Hall, Norham, Twizell, Coldstream, Sunilaws, Deadwater, Kershopefoot, Langholm, Longtown, Lyneside, Scotby, Weatherall, Heads Nook, How Mill, Brampton Town, Brampton Junction, Naworth, Low Row, Gilsland, Greenhead, Haltwhistle, Bardon Mill, Haydon Bridge, Fourstones, Hexham, Corbridge, Riding Mill, Stocksfield, Prudhoe, North Wylam, Wylam, Heddon-on-the-Wall, Ryton, Newburn, Lemington, Scotswood, Elswick, Newcastle Central, Manors, St. Peters, Heaton, Walker, Walker Gate, Wallsend, Howdon-on-Tyne, Percy Main, North Shields, Tynemouth.

Area (2). *Cumberland.*—Bowness, Port Carlisle, Gretna Floriston, Rockcliffe, Harker, Carlisle, Wreay, Southwaite, Calthwaite, Plumpton, Penrith, Eamont Bridge Junction, Clifton and Lowther, Shap, Tebay, Low Gill, Sedbergh, Middleton, Barbon, Kirkby Lonsdale, Ingleton, Melling, Hest Bank.

Area (3). *Durham.*—South Shields, High Shields, Tyne Dock, Jarrow, Hebburn, Pelaw, Felling, Gateshead, Bensham, Redheugh, Swalwell, Derwenthaugh, Blaydon, Elrington, Featherstone Park, Cumwhinton, Cotehill, Armathwaite, Lazonby, Little Salkeld, Langwathby, Culgaith, Cliburn, Temple Sowerby, Kirkby Thore, Appleby, Ormside, Crosby Garrett, Gaisgill, Ravestone Dale, Kirkby Stephen, Hawes Junction, Dent, Ribblehead, Leyburn, Sinderby, Otterington, Levesham, Scalby.

Area (4). *Lancashire.*—Morecambe, Bare Lane, Lancaster, Halton, Caton, Hornby, Wennington, Low Bentham, Bentham, Clapham, Horton, Settle, Long Preston, Hellifield, Bell Busk, Gargrave, Skipton, Elslack, Thornton, Earby, Foulridge, Colne, Nelson, Brierfield, Burnley, Townley, Holme, Portsmouth, Cornholme, Stansfield Hall, Todmorden, Walsden, Littleborough, Smithy Bridge, Milnrow, New Hey, Shaw and Crompton, Delph, Diggle, Saddleworth, Upper Mill, Greenfield, Friezland, Mossley, Micklehurst, Staley and Millbrook, Stalybridge, Godley, Woodley, Bredbury, Marple, Strines, Hayfield, New Mills, Bugsworth, Chinley, Furness Vale, Disley, Poynton (G.C. & N.S. Jt. and L. & N.W.), Wilmslow, Mobberley, Preston Brook, Sutton Weaver, Halton, Runcorn, thence by the Mersey to the sea.

Area (5). *Yorkshire.*—Scarborough, Forge Valley, Wykeham, Sawdon, Snainton, Ebberton, Thornton Dale, Pickering, Sinnington, Kirby Moorside, Norton, Helmsley, Thirsk, Topcliffe, Baldersby, Melmerby, Tanfield, Masham, Lofthouse-in-Nidderdale, Grassington, Rylstone, Crookrise, Embsay, Bolton Abbey, Cononby, Kildwick, Steeton, Keighley, Eastwood (L. & Y.), Marsden (L. & N.W.), Mottram and Broadbottom (Gt. Cent.), Dore and Totley (Mid.), Killamarsh (Mid.), Upperthorpe and Killamarsh (G.C.), Kiveton Park (Gt. Cent.), Barnby Moor and Sutton (G.N.), Beckingham (G.N. & G.E. Jt.), Blyton (Gt. Cent.), Market Rasen (Gt. Cent.), Louth (G.N.), Saltfleetby (G.N.), Theddlethorpe (G.N.).

Area 6. *North Wales.*—South of the River Mersey to Saltport (inclusive), Frodsham, Mouldsworth, Tattenhall Road, Malpas, Fenns Bank, Bettisfield, Old Woods, Leaton, Hanwood Road, Crockton, Ford and Crossgates, Criggion, Pool Quay, Seven Stars, Caersws, Pontdolgoch, Carno, Talerddig, Llanbrynmair, Cemmes Road, Machynlleth, Dovey Junction, Aberdovey.

Area 7. *North Staffs.*—Weaver Junction, Knutsford, Alderley Edge, Adlington, Bollington, Hartington, Alsop-en-le-dale, Tissington, Fenny Bentley, Thorpe, Cloud, Ashbourne, Clifton, Norbury, Rocester, Uttoxeter, Bromshall, Grindley, Chartley, Weston and Ingestre, Ingestre for Weston, Salt, Great Bridgeford, Tern Hill, Prees, Whitchurch, Wrenbury, Beeston Castle, Delamere.

Area (8). *Eastern Counties.*—Mablethorpe, Legbourne Road, Hallington, Withcall, Donington-on-Bain, South Willingham and Hainton, Wickenby, Gainsborough, Sturton, Clarborough Junction, Retford, Checker House, Edwinstowe, Farnsfield, Burton Joyce, Radcliffe-on-Trent, Long Clawson and Hose, Scalford, Melton Mowbray, Oakham, Manton, Uppingham, Seaton, Morcott, Luffenham, Ketton, Stamford, Uffington, Barnack, Helpston, Walton, Peterborough, Whittlesea, Benwick, Whitemoor, March, Stonea, Manea, Black Bank, Chettisham, Ely, Soham, Fordham, Kennet, Higham, Saxham and Risby, Bury St. Edmunds, Thurston, Elmswell, Houghley, Stowmarket, Needham, Claydon, Bramford, Ipswich, Westerfield, Derby Road, Orwell, Trimley, Felixstowe.

Area (9). *Shropshire.*—Wem, Yorton, Hadnall, Shrewsbury, Meole Brace, Redhill, Hanwood, Yockleton, Westbury, Middletown, Buttington, Welshpool, Forden, Montgomery, Abermule, Newtown, Scafell, Bucknell, Woofferton, Easton Court, Tenbury Wells, Newnham Bridge, Bewdley (G.W.), Codsall (G.W.), Haughton (L. & N.W.), Hodnet (G.W.).

Area (10). *Birmingham and District*—Stafford, Stafford Common, Hixon, Armitage, Lichfield, Tamworth, Polesworth, Atherstone, Nuneaton, Chilvers Coton, Bedworth, Hawkesbury Lane, Wyken Colliery, Longford and Exhall, Foleshill, Bell Green, Gosford Green, Coventry, Coundon Road, Kenilworth, Warwick (Milverton), Leamington, Southam Road and Harbury, Fenny Compton, Cropredy, Banbury, Kings Sutton, Adderbury, Aynho, Aynho Park, Fritwell and Somerton, Heyford, Bletchington, Blenheim and Woodstock, Kidlington, Yarnton, Oxford Road, Wolvercot, Oxford, Handborough, Charlbury, Ascott-under-Wychwood, Shipton, Kingham, Adlestrop, Moreton-in-Marsh, Blockley, Campden, Honeybourne, Littleton and Badsey, Evesham, Fladbury, Pershore, Stoulton, Abbots Wood Junction, Norton Junction, Spetchley, Fernhill Heath, Droitwich, Hartlebury, Stourport, Kidderminster, Churchill, Hagley, Stourbridge, Brettell Lane, Brierley Hill, Round Oak, Harts Hill, Netherton, Dudley, Dudley Port, Tipton, Princes End, Deepfields, Daisybank, Bilston, Ettingshall Road, Priestfield, Monmore Green, Wolverhampton, Dunstall Park, Bushbury, Four Ashes, Gailey, Penkridge.

Area (11). *Northants and Essex.*—Edwalton, Plumtree, Widmerpool, Upper Broughton, Old Dalby, Grimstone, Holwell, Ashfordby, Great Dalby, John-o'-Gaunt, Marefield Junction, Tilton, East Norton, Rockingham, Gretton, Harringworth, Wakerley and Barrowden, Ufford Bridge, Orton Waterville, Fletton, Wimblington, Stretham, Burwell, Newmarket, Welnetham, Bentley, Harwich, Parkeston Quay, Dovercourt Bay, Brightlingsea, Tollesbury Pier, Langford, Hatfield Peverel, Broxbourne and Hoddesdon, Hertingfordbury, Cole Green, Welwyn, Ayot, Wheathampstead, Harpenden, Redbourne, Hemel Hempstead, Berkhamsted, Wendover, Little Kimble, Haddenham, Ashendon Junction, Islip, Bicester, Ardley, Farthinghoe, Chalcombe Road, Eydon Road, Byfield, Southam and Long Itchington, Marton Junction, Brandon and Wolston, Shilton, Bulkington, Ullesthorpe and Lutterworth, Broughton Astley, Countesthorpe, Great Glen, Thurnby and Scraptoft, Rearsby, East Leake, Gotham, Ruddington.

Area (12). *South Wales and Mon.* Ynyslas, Glandyfi, Trewythan, Moat Lane Junction, Knucklas, Knighton, Kingsland, Greenhill, Tram Inn, St. Devereux, Dingestow, Raglan, Llandenny, Portskewett, thence by River Severn to the sea.

Area (13). *South-Western Counties.*—Chepstow, Tidenham, Tintern, St. Briavels, Redbrook, Monmouth, Symonds Yat, Lydbrook, Kerne Bridge, Ross, Fawley, Ballingham, Holm Lacy, Hereford, Moreton-on-Lugg, Dinmore, Ford Bridge, Leominster, Berrington and Eye, Worcester Shrub Hill, Wadborough, Defford, Bengeworth, Bretforton and Weston-sub-Edge, Stow-on-the-Wold, Eynsham, Kennington Junction, Radley, Culham, Didcot, Upton and Blewbury, Churn, Compton, Hampstead Norris, Hermitage, Newbury, Woodhay, Highclere, Burghclere, Litchfield, Whitchurch, Sutton Scotney, Kingsworthy, Winchester, Shawford and Twyford, Eastleigh, Bishopstoke, Swaythling, Southampton, Bitterne, Woolston, Sholing, Lymington.

Area (14). *South-Eastern Counties and London.* — Isle of Wight, Netley, Botley, Bishops Waltham, Itchen Abbas, Micheldever, Overton, Thatcham, Goring and Streatley, Cholsey and Moulsford, Littlemore, Wheatley, Tiddington, Thame, Bledlow, Princes Risboro', Great Missenden, Chesham, Boxmoor, St. Albans, Smallford, Hatfield, Cuffley and Goffs Oak, Cheshunt, North Weald, Blake Hall, Ongar, Chelmsford, West Maldon, Maldon East and Heybridge.

Area (15). *Notts and Derby.* — Whaleybridge, Chapel-en-le-Frith, Edale, Hope, Bamford, Hathersage, Grindleford, Dronfield, Eckington and Renishaw, Spink Hill, Shireoaks, Worksop, Clipstone, Mansfield, Bledworth and Rainworth, Gedling, Carlton and Netherfield, Netherfield, Nottingham, Beeston, Attenborough, Trent, Castle Donington, Weston-on-Trent, Chellaston, Repton and Willington, Egginton, Rolleston-on-Dove, Tutbury, Sudbury, Marchington, Longcliffe, Friden, Parsley Hay, Hurdlow, Hindlow, Harpur Hill, Ladmanlow, Buxton, Dove Holes.

Area (16). *Leicestershire.*—Burton, Stretton and Clay Mills, Melbourne, Kegworth, Hathern, Loughborough, Barrow-on-Soar, Sileby, Syston, Leicester, Humberstone, Humberstone Road, Wigston, South Wigston, Whetstone, Narborough, Croft, Elmesthorpe, Hinckley, Higham-on-the-Hill, Elford, Croxall, Wichnor, Alrewas.

Area (17). *Scotland, South-Eastern Counties.*—Burnmouth, Ayton, Carham, Sprouston, Kelso, Roxburgh, Kirkbank, Nisbet, Jedfoot, Jedburgh, Saughtree, Steele Road, Newcastleton, Kirkpatrick, Kirtlebridge, Ecclefechan, Lockerbie, Netherclough, Dinwoodie, Wamphray, Beattock, Moffat, Elvanfoot, Crawfordjohn, Thankerton, Bankhead, Tarbrax, South Cobbinshaw, Breich, Woodmuir, Bents, Whitburn, Polkemmet, Weighs, Bathgate, Bangour, Linlithgow, Philpstoun, Dalmeny, South Queensferry, Barnton for Cramond Brig, Granton, Leith.

Area (18). *Scotland, North-Western Counties.*—Wemyss Bay, Bridge of Weir, Houston (G. & S.W.), North Johnstone, Elderslie, Paisley West, Gleniffer Depot, Barrhead, Netherton, Patterton, Whitecraigs, Busby, Thorntonhall, Hairmyres, East Kilbride, Strathaven, Coalburn, Inches, Douglas West, Poneil Jct, Douglas, Ponfeigh, Sandilands,

Lanark, Cleghorn, Carstairs, Carnwath, Auchengray, Haywood, Mouldron, Fauldhouse and Crofthead, Armadale, Armadale Colliery, Westfield, Bowhouse, Causewayend, Lochmill, Manuel, Kinnie, Bo'ness, Bridgeness, Grangemouth, Dalders, Falkirk, Larbert, Airth, South Alloa, Throsk, Plean, Bannockburn, Gargunnock, Doune, Comrie, thence to a point south of Inverness (exclusive) to Kyle of Lochalsh (exclusive).

Area (19). *Scotland, North-Eastern Area.*—Burntisland, Aberdour, Inverkeithing, North Queensferry, Charlestown, Cairneyhill, Torryburn, Culross, Kincardine, Alloa, Cambus, Stirling, Bridge of Allan, Dunblane, Kinbuck, Crieff, Dalnaspidal, Dalwhinnie, Newtonmore, Tomstin, Mey, Daviet, Inverness, Bunchrew, Lentran, Clunes, and all stations on the Highland Railway north of a line drawn from Beauly to Kyle of Lochalsh (inclusive).

Area (20). *Scotland, South-Western Area.*—Largs, Kilbarchan, Johnstone, Neilston, Ryeland, Glenbuck, Leadhills, Wanlockhead, Lochmaben, Annan, Dornock, Rigg, Gretna Green.

[**Continued from p. 63.**]

areas, and an area producing more coal than it requires for consumption within the area itself should only distribute the balance to adjacent or convenient areas.

The three columns in the table, p. 63, form an interesting study in this latter connection.

A Conservative Estimated Saving.

Statistics which have been taken out, after providing for the additional demands upon coal for industrial purposes that are continually being made—for instance, the starting-up of new blast-furnaces in different parts of the country is going on at a very rapid rate—show that 42,000,000 tons of coal will be dealt with under this initial scheme; and it is regarded as highly conceivable that the estimated saving of 700 million ton-miles will prove to be a conservative one, because in this is not taken into account the saving of the distance which empty wagons now have to be hauled back to the collieries, nor any economy that will be made in marshalling and shunting all these wagons.

Special Fuel for Special Purposes.

Having laid down the four general principles set out above, it has been found essential, as regards No. 4, to make some reservation in the interests of the need for the provision of fuel of a special type for a special purpose. Arrangements are therefore being made for the issue of certificates authorizing supplies of coal of a special type required by steam raisers for special purposes—*e.g.*, mechanical stokers, gas-producers, &c. In the absence of such certificates, collieries, factors, and merchants will be unable to supply the special quality.

Coal and Coke Supplies Committees—An Independent Committee.

Before the advent of the Coal Controller, the Board of Trade had appointed District Coal and Coke Supplies Committees—and many have been the complaints regarding their decisions. It was the duty of these Committees to see that the Government factories and public utility companies and, to a certain extent, domestic users had their requirements met. Whatever may be the opinions of some of those who have had in the past to abide by decisions of these Committees, it must be placed on record also that, in the Coal Controller's office, the opinion is emphatically held that they have done excellent work. Indeed, these Committees have been empowered by the Controller to conduct the necessary arrangements for putting the new scheme into force; the only modification being that an additional member has been added in each district, who is entirely unconnected with the coal trade. A man of public importance in each district has been selected for this purpose, with the object of seeing that the Committees work on fair principles in every respect. This must by no means be construed into a suggestion that hitherto these Committees have not worked fairly and well; but, with such a big scheme as the new one, it was felt by the Coal Controller that there should be somebody on the Committees who had no interest in coal.

By proceeding on these lines, it is considered that a minimum of inconvenience will be caused to all concerned, as collieries in each area will thus be placed in direct touch with the factors, merchants, and direct consumers whose supplies they will have to provide in future. There will consequently be no necessity for those whose supplies are affected under the scheme to proceed in search, on the one hand, of new customers or, on the other, of new collieries. As a safeguard, however, should any factor, merchant, or direct coal consumer not hear from a colliery by Aug. 27, that it is authorized to send supplies, a communication should be made to the District Coal and Coke Supplies Committee stating full particulars, in order that inquiries may be conducted and arrangements made for a supply before the scheme comes into operation throughout Great Britain on Sept. 10. In developing the scheme generally, there has been a free interchange of views with the District Committees as representing the colliery owners; and there have been meetings with factors and merchants. The Coal Controller is also in touch with the Railway Executive Committee, with a view to ensuring that adequate arrangements are set-up to meet the changed conditions in the flow of traffic.

One point may be emphasized, and it is that the scheme does not affect water-borne coal, either export, coastwise, or bunkers, or anthracite, or coke of any description.

Contracts Cancelled on Sept. 8.

In the case of coal affected by the scheme, existing contracts will be cancelled at 6 p.m. on Sept. 8; and new contracts, to be arranged between now and that date, will come into operation, as already mentioned, on Monday, Sept. 10.

Maps and Details.

One important point is that maps and a diagram* have been prepared which, in conjunction with the explanatory memorandum which has been issued by the Coal Controller, and may be obtained from his department, will enable coal consumers to see from what areas they can get their supplies. Upon this, the schedule already given throws considerable light.

All this, of course, takes into prime consideration the use of coal for industrial purposes. So far as the domestic supplies of London are concerned (London being probably furthest removed of any large centre from the coalfields), there are still difficulties; although having regard to the conditions at sea it is pleasing to know, as we do, that the amount which comes now by water from the North to London runs into millions of tons per annum.

A Good Augury and Possibilities.

A good augury that the scheme will be accepted loyally by those in whose interests it has been designed is the manner in which, as the result of interviews between the Coal Controller and various important sections of industry depending upon coal, assurances have been given that they would be able to carry out their obligations even if they had to put up with an inferior class of coal. Looked at from this point of view, it may perhaps be that an inferior coal is, after all, better than no coal at all; and left without real control, it is not impossible that this position in many instances might have been reached next winter.

Many possibilities, of course, arise out of the scheme, and, as far as humanly possible, the Controller's department is doing its best to anticipate at any rate the most important. There is no intention, for instance, to allow seaborne coal at present under contract to be transferred to rail. Then we are able to say that, although the Local Government Board might be unwilling to relax the London regulations as to smoke emission, the fact that inferior coals will have to be used under the scheme, and probably more smoke emitted, will be borne sympathetically in mind.

The possibility of a combine among the coal owners in the scheduled areas, bearing in mind that competition from outside will practically be eliminated, has been put forward; but any such attempt is likely to receive sharp treatment.

Insistence on the Price Limitation Act being Observed.

The Coal Controller, when addressing both the Institution of Gas Engineers and the Incorporated Municipal Electrical Association, expressed his determination to enforce the terms of the Coal Price (Limitation) Act; and, although there is no disguising the fact that this Statute has not been particularly successful in protecting the consumer—the purpose with which it was designed—yet it is capable of enforcement. That this is the view of the Coal Controller's Department is manifest from the decision not to leave the matter in the hands of the District Committees. It is, in fact, to be dealt with from headquarters, and, from assurances that we have, in no uncertain manner.

BOARD OF TRADE ORDER.

The Board of Trade Order under which the scheme is to be carried into effect was issued in the "London Gazette" on Friday. It is as follows:

(1) With a view to effecting economies in transport and of facilitating the supply of coal, such restrictions may be placed on the transport of coal from particular areas or particular collieries in the United Kingdom to particular areas or particular destinations as the Board of Trade may from time to time consider necessary; and, when such restrictions are so placed, it shall be the duty of every person affected thereby to comply with the requirements of the Board of Trade for the purposes of giving effect thereto.

(2) Contracts for the sale of coal shall be abrogated to such extent and as from such dates as may be deemed by the Board of Trade to be necessary in order to secure compliance with their requirements under this Order.

(3) The requirements of the Board of Trade under this Order shall be notified in the form of directions issued from time to time by the Controller of Coal Mines. Such directions may relate to any or all of the following matters: (*a*) The restriction or discontinuance of the transport of coal from particular areas or particular destinations, either absolutely or by any specified method of transport or otherwise than by such method of transport as may be specified. (*b*) The contracts which are to be regarded as abrogated with a view to facilitating compliance with such directions. (*c*) Furnishing information by and to such parties and in such forms as may be specified in the directions. (*d*) Any other matters for which provision may be necessary for the purpose of this Order.

(4) Infringements of this Order are summary offences, subject to penalties under the Defence of the Realm Regulations.

(5) This Order may be cited as the Coal Transport Order, 1917.

* Copies of these maps, also of the diagram illustrating the effect of the scheme on the area interchanges, have been prepared by the Railway Clearing House, and may be obtained, with a pamphlet embodying full instructions, by all concerned, post free, on application to the Secretary, Railway Clearing House, 123, Seymour Street, London, N.W. 1.

THE COMPLETE GASIFICATION OF COAL.

By Dr. Alex. Naumann, Professor of Chemistry at the University of Giessen.

A brief abstract, taken from the "Journal of the Society of Chemical Industry," was given in the "Journal" for June 12 of an article in the "Chemiker Zeitung" for Jan. 3 last, by Dr. Alex. Naumann, where he described a scheme for the complete gasification of coal to which a good deal of prominence has lately been given in Germany. The following is a fuller summary of Prof. Naumann's contribution—translated from the original.

Introductory.

The problem of how coal can be gasified without leaving any residue except incombustible ash or clinker has been solved recently. The solution is by means of a simple plant, complete in itself, with internal gas heating, which effects considerable economy of energy and affords great latitude in the bye-products and description of gas produced, and a large yield of ammonia, while it may be applied to any carbonaceous fuel as well as coal. The process in question has been worked out by the Dellwik-Fleischer Water Gas Company, of Frankfort on the Maine, through Herr E. Dolensky, the Manager of the Company. Incidentally, the Company had previously effected the complete gasification of coal by converting coke resulting from the carbonization of coal into water gas in plant of which the units were constantly increasing in capacity or output. Their more recent development of the complete gasification of any kind of coal has been described in a monograph of 95 pages by E. Dolensky, entitled "The Complete Conversion of Coal into High-Grade Gas and Valuable Liquid Products by Simultaneous Gasification and Volatilization."

The Process.

The plant or producer ought to utilize the coal completely, except for its ash, in producing a high-grade gas as nearly as possible consisting only of combustible constituents, while affording a maximum yield of high-class oils and converting as much as possible of the nitrogen into ammonia. The producer or carbonizer adopted to achieve these objects consists of a tall vertical vessel or retort, heated internally by gas. The coal passes slowly downwards through this producer, while the heating gases pass upwards; the temperature increasing gradually from the top to the bottom. Water, ammonia, readily volatile oils, and high-grade gas are first given up by the coal, which later yields viscous tar, methane, and its homologues, and finally, along with hydrogen (which has already been evolved to some extent), carbonic oxide. The completely carbonized coal passes on as coke to the generator, which is directly underneath the carbonizing chamber with no dividing wall or partition. In this lower part of the plant the coke reacts with steam to produce water gas, which serves to drive off the volatile constituents of the coal in the upper part. The supply of heat needed for the generation and carbonization is provided by periodical "blows" of the coke; the products of combustion resulting from the "blows" being discharged into the outer air. The air blast for the "blows" enters at the zone between the upper and lower parts of the plant, and travels downwards through the coke in the lower part, where the pressure is reduced. Simultaneously a hot blow across the lower part of the generator, in which the bottom of the column of coke is poor in carbon and rich in ash, is maintained by a reversible air-blast passing over a fire bridge.

After "blowing" for one to three minutes, steam is passed up through the column of coke for from five to ten minutes. The water gas produced, along with the undecomposed steam, rises in its highly heated state through the column of carbonizing coal, and by its sensible heat promotes rapid carbonization of the coal and evolution of its volatile constituents. Finally the mixed gases pass through the unaltered coal, and their sensible heat distils products from it. They then pass on to the hydraulic main, thence to condensers, washers, and purifiers, and so to a holder. Provision is made, if necessary, to burn a small proportion of the water gas by introducing air at the dividing zone between the coal carbonizer and the water-gas generator, in order to increase the temperature to the required degree if the coal carbonization does not take place satisfactorily without such aid. The resultant gas is thereby slightly diluted with the products of combustion of the water gas. If, on the other hand, a particular coal needs a lower temperature for its carbonization, or greater humidity is desired in order to increase the yield of ammonia, steam may be introduced at the dividing zone to supplement the excess of steam supplied for water-gas generation.

These arrangements admit of the most favourable conditions of temperature and humidity being provided for dealing with any particular coal, and for obtaining the best yields of gas, oil, and ammonia. The process is known as the triple or tri-gas process. It is claimed that it will handle any kind of coal, giving complete conversion into gas, tar, and ammonia, and leaving only fully exhausted clinker or ash as a residue. The gas-making plant proper needs the ordinary auxiliary equipment of coal-handling plant (bunkers, elevators, conveyors, &c.) by which the coal is brought to the charging-hoppers. The working of the plant is controlled from the top stage.

The experimental plant had a capacity of 100 to 200 tons of coal per hour, and has been on trial for over a year. Every trial has extended continuously over several days—the last trial, in May, 1916, lasted for 21 days. Samples of the coal used and of all the products were taken; the gas was measured, analyzed, and its calorific power determined. After the first trial in June, 1915, a reconstruction of the generator was carried out, with the result that a perfectly satisfactory construction was obtained. It is possible to modify the working to produce at will more high-grade gas, or more oil, or more ammonia. Both coal and brown coal (lignite) have been gasified quite satisfactorily in their natural moist condition—even Bosnian brown coal permeated by 30 p.ct. of rock has been dealt with readily. The residue is either fully burnt ash or a soft clinker mixed with lumps. The gas made varies, according to working conditions, from 210 to 370 B.Th.U. per cubic foot—even from brown coal a gas of 315 B.Th.U. was obtainable. Readily volatile oils were produced, and the yield of ammonia approached the theoretical maximum, when favoured by humidity, rapid extraction, and low temperature. The gas left the generator at a temperature of only about 100° C.

Quality of "Tri-Gas."

The composition of the gas varies, according to the description of coal treated and the mode of working, between the following limits:

	Good Coal, Per Cent.		Wet Lignite, Per Cent.
Hydrogen	50·0	..	41·0
Methane	10·0	..	5·0
Carbon monoxide	30·0	..	26·0
Heavy hydrocarbons	1·0	..	0·4
Carbon dioxide	5·0	..	9·0
Nitrogen	4·0	..	18·0

The calorific power, according to the description of fuel—lignite, brown coal, or bituminous coal—and the working conditions, ranges from 260 to 370 B.Th.U. per cubic foot. The gas is merely a mixture of water gas and coal gas, with, in a few cases, small quantities of producer gas. Hence it has been named "Tri-gas." Water gas is its predominant constituent, as must be evident from the fact that coal on carbonization yields 70 p.ct. of coke. The properties of "Tri-gas" are essentially those of water gas. It is less dense than producer gas, which is an advantage from the distribution standpoint. It has a higher temperature of combustion (flame temperature) than coal gas, and consequently affords a better utilization of its heating value in all processes requiring a high temperature, such as smelting, welding, and many chemical processes. Thus it is claimed to be a high-grade heating gas.

Economy of the Process.

The calculations of cost, based on the results of the trials in the experimental plant, show, according to Dr. Naumann, that the process is highly economical. [The calculations are not given in the paper.] With a good brown coal, the receipts for tar and sulphate of ammonia cover all expenses, leaving the receipts for the gas produced as net profit. With bituminous coal, after deducting the receipts for tar and sulphate of ammonia, the cost of the gas works out at about 2·04d. per 1000 c.ft. Having regard to the high-grade of the gas as an industrial fuel, its transmission to considerable distances by comparatively small mains would pay well; and its distribution from a central works to factories, towns, and villages should leave a high profit. It presents the best means of overcoming the prejudice against the abolition of the use of coal as fuel, and hence of doing away with the wastefulness inseparable from the combustion of solid fuel.

State Control.

It may be predicted that the simplicity and economy of the Tri-gas process will make it a powerful aid to large industrial concerns, companies, corporations, &c. This may not tend to the greatest economy and the highest benefit of the consumer, or, in other words, to the common weal. It is only necessary to refer to the cognate case of the spendthrift policy of the existing electricity combines, which comprise large numbers of electricity supply undertakings working in unison. Their operations are contrary both to public economy and to the consumers' interests. It should be the duty of the State to see that these adverse conditions are not extended to the far-reaching benefits which the provision of energy by the Tri-gas process will afford. The advantage of the community as a whole should be kept in the foreground, rather than the greater profit of individual undertakers and large companies, which have taken advantage of war conditions to strengthen themselves by combination, which will ultimately be to the detriment of the consumer. The only plan is for the State either to control the operations of such undertakings, or itself to produce and distribute their products.

In order to prevent the senseless waste of coal which has hitherto prevailed, State control is essential, not merely to secure the general introduction of complete coal gasification, but also to prevent the use throughout Germany of apparatus which is wasteful of energy. In this way, raw coal will be economized, and producers, distributing schemes, &c., of the highest duty will be provided. The State should say before it is too late not only what must be done, but how it must be done. The coal supplies of Prussia alone, if gasified in the manner indicated above, would suffice to supply the energy required by the whole of Germany for heating, lighting, and power. There would thus be provided

a great source of revenue for wiping-out the war debt, and excessive taxation of the citizen would thereby be avoided. State intervention is imperatively called for in order to ensure that every user obtains a supply of energy for heat, light, and power through cheaply made heating gas. A great part of the coal now so lavishly expended would then be saved for posterity. This "burning question" needs to be tackled by the State in the near future, and for their own protection and for the commonweal, the small consumers, the middle classes, tradespeople, &c., should see that their interests therein are well represented in the Reichstag or Parliament, where the interests of the big industrial undertakings are already strongly represented.

In a footnote, the author points out that Dr. E. R. Besemfelder has conceived a process, which he describes in an article published early in 1916, which resembles the Tri-gas process, which had then already been on practical trial. He proposes to pass hot water gas through the coal in a bench of vertical retorts, which would also be heated externally by the complete combustion, in flues surrounding them, of the "blow" gases from the water-gas generators. The coke from the vertical retorts would be discharged into the water-gas generators on a lower level. Besemfelder calculates that the recovered sulphur would not merely cover all the requirements of Germany for home consumption, but would leave a surplus for the export of sulphur and preparations made from it. The present vitiation of the atmosphere by the combustion of the sulphur of the coal would also be avoided.

LOW-TEMPERATURE CARBONIZING.

A paper was read last February before the Glasgow Section of the Society of Chemical Industry, by Mr. Robert Maclaurin, on "Low Temperature Carbonizing and Some Products." An abstract of the communication will be found in the "JOURNAL" for March 13 (p. 517); and Mr. Maclaurin's system was described and illustrated in the issue for Aug. 8 last year (p. 256). The full text of the Glasgow paper is, however, now available in the Society's "Journal;" and from it is reproduced the following portion referring to the production of gas. The plant on which the work was carried out is erected at Port Dundas. It has two compartments—one (A) for the production of smokeless fuel and illuminating gas, and the other (B) for the production of power gas, both with oil and ammonia as bye-products.

To ascertain how much hot gas would be required to carbonize satisfactorily one ton of coal, 13 tons of coal were treated, yielding an average of 13,725 c.ft. of gas per ton. All the coke coming out during the run, which was of 22 hours' duration, seemed satisfactorily carbonized. Assuming 5000 c.ft. of rich gas (of 700 to 800 B.Th.U.) to be given off from each ton of coal in compartment A, this meant a make of about 9000 c.ft. of producer gas in compartment B; and as this gas presumably had a value of about 130 B.Th.U., the calorific value of the mixed gas should have been 351 B.Th.U. The average value found by calorimeter was 180 B.Th.U., and by gas analysis on one sample 206 B.Th.U. The small quantity of hot gas necessary to carbonize the fuel was very gratifying; but the low calorific value was both disappointing and inexplicable. According to published figures by the late Prof. V. B. Lewes, with distillation at 400° C. a ton of coal would yield the products shown in Column 1. Column 2 shows what were obtained at Port Dundas. Column 3 shows gas-works results with high-temperature carbonization.

—	Carbonizing at 400° C.	Port Dundas Method.	Gas-Works' Practice.
	C.Ft.	C.Ft.	C.Ft.
C_nH_{2n}, &c. . . .	315	53	317
CH_4, &c. . . .	3000	1420	3755
H_2	1060	1685	4627
$CO+CO_2$ . . .	620	2973	1200
N_2	50	6294	100

In this trial therefore one-sixth of the olefines was obtained by low-temperature and high-temperature distillation, and less than half the volume of methane. Unfortunately at this stage accurate measurements of the oil were impossible, owing to the difficulty of separating oil from water; but the percentage of light oil was ascertainable. The following are the figures, supplied to the author by the Gas Department, for the portion of the oil condensing in the first scrubber: Sp. gr. of water-free oil, 1·037. Distilling at 170° C. =0·34 p.ct., sp. gr. ·968; 170° to 270° C.=21·26 p.ct., sp. gr. ·970; 270° to 425° C.=15·41 p.ct., sp. gr. ·0995; residue (solid), 62·30 p.ct., sp. gr. 1·085; loss, 0·69 p.ct.

The crude naphtha from low-temperature tars is given by Lewis T. Wright as equal to 9 p.ct. on the tar, or 9 lbs. per ton of coal. With a high temperature it falls to 3·45 p.ct. or about 3½ lbs. per ton. In the Port Dundas results it falls to about ½ lb. per ton of coal.

In a second test run the gas was no better. The quantity of oil obtained, however, amounted to about 16 gallons per ton of dry coal. This time the distillate up to 170° C. gave 2·6 p.ct. of naphtha, of sp. gr. ·965.

A third test was made in March of last year, using water gas made by decomposing steam in compartment B, for effecting the carbonization of the fuel. Naturally, this gave a better gas, owing to the comparative freedom from nitrogen; but the percentage of olefines varied from 0·2 to 1·1 p.ct., and the methane from 7 to 13 p.ct. The gas was, therefore, in this respect little better than formerly.

To ascertain whether light oils, if produced, could pass the scrubbers, gasoline of sp. gr. ·650 was added both before and after the first scrubber at the rate of ½ gallon per 1000 c.ft. The improvement in the gas at the gasholder was not apparent, and analyses showed the olefines and the methane to be practically unchanged. In the first test the olefines amounted to 0·2 p.ct., in the second to 1·1 p.ct.—practically the same as for the preceding two tests when no gasoline was used. The completeness with which the scrubbers were removing the gasoline might have misled; but fortunately the next test saved an erroneous impression. The scrubbers are centrifugal brush scrubbers, designed for cheapness. Each scrubber is 10 ft. × 4 ft. In order to keep conditions as uniform as possible, during the additions of the gasoline, the fuel was not disturbed in either A or B compartment; but as soon as the tests were over, ash was removed in compartment B, and an immediate improvement in the composition of the gas followed. The olefines rose to 1·4 p.ct., the methane to 15·7 p.ct., and the calorific value to 377 B.Th.U. This improvement in the gas followed the bringing down of new fuel in compartment B, and the rise in the olefines was undoubtedly due to the hydrocarbons driven off from this fuel being partly decomposed, as they passed up through the hot fuel in compartment A, into ethylene and other light hydrocarbons. The scrubber allowed these light gaseous hydrocarbons to pass, while it prevented the passing of the heavier hydrocarbons of the gasoline.

These results, together with later results and numerous unrecorded results, convinced the author that it was hopeless to look for rich gas by a true low-temperature method, though he firmly believed that illuminating gas would yet be made in a plant such as had been described. This, however, will be done by a semi-high temperature method.

On the completion of the third trial, in an endeavour to account for the absence of the light hydrocarbons, the oils were examined more thoroughly. The oil was so hopelessly mixed up with the ammoniacal liquor that it seemed quite impossible to get it into a marketable state. Even a sample, which to all appearance was water-free, showed about 20 p.ct. of water on distillation.

Synthetic Gasoline in the United States.

In a recent issue, "Engineering" published the following paragraph: We have repeatedly referred to the gasoline cracking process of Dr. W. F. Rittman, and have heard critical comments on the process and doubts as to its efficiency. In a paper, read in April before the Kansas City meeting of the American Chemical Society, entitled "One Billion Gallons of Synthetic Gasoline in the year 1918," Rittman mentioned that 600 million gallons of gasoline would be prepared in the United States in 1917, and the production would reach 1000 millions in 1918. This was necessary to meet the ever-increasing demand. The gasoline recovery from natural gas had increased from 7 million gallons in 1911 to 200 millions in 1917; the crude oil production from 135 million gallons in 1905 to 292 millions in 1916; and the gasoline production from 7 million gallons in 1904 to 70 millions in 1917 [we give round numbers]. The extensive demand had been met by taking a larger portion of motor fuel from the crude oil and calling it gasoline, and by cracking heavy oils for gasoline; but it is indeed a question of general economy how much further the supply of petroleum should be placed at the disposal of the synthetic gasoline manufacturer.

Midland Junior Gas Association.—The tenth annual general meeting of the Association will be held in the Council House Reading Room, on Thursday, to receive the report for the three sessions 1914-17 and the balance-sheet, as well as to transact other formal business. Afterwards there will be a debate on the question of whether gas for lighting purposes will be superseded in the future by electricity. The Association have 38 members absent on war service.

A Large Gas-Fired Annealing Furnace.—Details are given in the "Iron and Coal Trades Review" of a large Stein and Atkinson gas-fired furnace installed for annealing large forgings at the works of Messrs. W. Somers & Co., Ltd., of Halesowen. The furnace, which has replaced coal fuel, was not put down particularly with a view to higher economy in working costs; the prime consideration being better and more uniform results. In practice it has thoroughly justified itself, both in regard to efficiency and economy. The supply of gas is so arranged as to allow of the temperature throughout the whole length of the furnace being under complete control. Indeed, if pyrometers are employed, it is possible to maintain an even temperature throughout the full length (75 ft.) of the furnace. This overcomes the difficulty of uneven heating of irregular forgings; it being possible to adjust the amount of gas supplied to each section. Another feature is that the amount of air admitted to the furnace being under control, any required atmosphere can be obtained.

MASSACHUSETTS GAS COMPANIES AND THE RECOVERY OF LIGHT OILS.

A Committee of the Massachusetts Gas Companies recently sent a communication to the War Department offering the services of the companies to the Government in the matter of the recovery of bye-products for making explosives. The communication was acknowledged with thanks; but nothing further has developed. The Committee have since had a conference with representatives of the manufacturers of recovery plant; and as a result they have come to the following conclusions:

(1) The Government is well supplied for its present needs by the existing coke-oven plants; and some of the larger companies of the country.

(2) The installation and development of the operation of the necessary apparatus in two or three of the larger companies of the country, which is now going on, will supply five times as much material as all the companies in New England, outside Boston.

(3) The manufacturers are not, at the present time, in a position to take orders for any more apparatus than they are now building for the larger companies; and the Government controls so much of the steel production that very little apparatus could be bought, except through orders from the Government.

(4) The question of the fractionation and purification of the crude light oils will have to be left to future developments.

(5) Companies should not attempt recovery under a candle-power standard.

(6) It was further brought out that the production of light oil in coke-oven plants alone in 1916 was 35,600,000 gallons, which yielded about 20,000,000 gallons of pure benzol and some 4,300,000 gallons pure toluol. There are in operation 7000 coke-ovens, at present carbonizing 31,000,000 tons of coal, and an additional number under construction of 2400, with a capacity of 15,000,000 tons of coal annually. If all these plants are completed and run at full capacity with a full recovery of light oil, there will be produced 101,500,000 gallons; and from this light oil would be obtained 60,000,000 gallons of pure benzol and 12,000,000 gallons of pure toluol. This does not include water-gas plants or coal gas produced from retorts; and it is estimated that two large companies will add 9,000,000 gallons of benzol and 4,000,000 gallons of toluol to these amounts, in the near future.

It therefore appears quite evident that the only work which your Committee can do at the present time is to compile data in regard to the amount of gas made in New England, and to render any other help to the Committee of the American Gas Institute, formed for the same purpose, who are working in conjunction with the Committee of Munitions of the Advisory Board of the National Council of Defence. These data have been given to the Committee.

Your Committee are also collecting further information, in order to be in a position not only to help the Committee of the American Gas Institute, but also to advise the Massachusetts companies, from time to time, as to the development of the work, and instruct them as to procedure, if it is found that our help is required.

Gas Made—1916.

	Cubic Feet.
Maine	576,601,360
New Hampshire	620,079,569
Vermont	245,324,800
Massachusetts (less Boston)	10,640,203,000
Rhode Island	2,523,075,490
Connecticut	4,709,966,665
	19,315,250,884
Boston	6,151,673,794
Total	25,466,924,678

VIEWS OF THE AMERICAN GAS INSTITUTE.

The following reference to the same matter, in which a somewhat different view is expressed of what is likely to be required of the gas industry, may be quoted from the June issue of the "American Gas Institute News."

The Advisory Commission of the Council of National Defence is now in full swing organizing the industries of the country for war, and assisting the Council of National Defence. A Committee known as the Committee on Chemicals, a Sub-Committee of the Advisory Commission, has been appointed. A Sub-Committee of the Committee on Chemicals, known as the Committee on Coal Tar Bye-Products, has also been appointed. This Committee is one that touches the gas industry very closely. The names of W. R. Addicks, W. E. M'Kay, C. J. Ramsburg, and W. H. Gartley appear on it.

The gas industry will doubtless be called upon to produce still larger quantities of benzol and toluol. It is logical to assume that the Government will soon find itself in the position in which the production of additional quantities of these materials for high explosives manufacture will be of the greatest urgency; and we know that the companies supplying gas to the various cities are the only resort now left for this production, except such as may be made by chemically treating natural gas. The gas companies of the larger cities not now engaged in recovering benzol and toluol from their gas may expect soon to be called upon for this work. How the expenditure is to be made and how the plants are to be installed, must be given serious consideration by the proper Federal officials. This is the next important step. When the questions of price to be paid for the toluol, and how the erection of the recovery plants are to be financed, are once satisfactorily settled, the work may be expected to go ahead with great rapidity; and millions of gallons of toluol and benzol can be produced. In those cities in which candle-power requirements are high, there must be a concession on the part of the Government and the Public Service Commissions having control, since high candle power and high heat units are not compatible with toluol and benzol extraction.

OBSERVATIONS ON CRUDE (COKE-OVEN) BENZOL.

At the Meeting of the London Section of the Society of Chemical Industry on Monday of last week, Dr. P. E. SPEILMANN gave an account of some recent work that has been carried out by him and Mr. G. CAMPBELL PETRIE. The object in view, when examining these distillates, was to extract more information from them than is obtainable from the retort test—a test which the authors think has little to recommend it, and has nothing to support it scientifically. With the idea of arriving at methods which will recommend themselves to the simplest works laboratory, no preliminary treatment was carried out; the samples being examined as received.

It has been found that if 100 c.ft. of crude benzol is distilled from a distilling flask such as is now so widely used in connection with Government tests and specifications, the amount obtained up to 90° C. can be made proportional to the quantity of benzene present, and that from 90° to 120° proportional to the quantity of toluene in the sample. A curve was shown giving the relation between the amount obtained by the distillation test and the percentage of toluene and benzene present in the sample by analysis. It was noticed that the distillation test results lay more regularly than the retort test results.

Another mode of examining crude benzols, yielding on the whole more accurate results, is to distil at least a litre over a Young 12 pear head, and to note the rise of temperature for every 5 or 10 p.ct. When such curves are plotted, it has been found that the horizontal distances below the 5 p.ct. mark and the point where the curve cuts the 92·5° C. line give a close measure of the percentage of benzene present; and a similar close estimation of the toluene present can also be made—the relationship being read off by means of a graph. It is believed that an equally simple estimation of paraffin can be arrived at, though the work done in this direction so far is quite insufficient for the establishment of a definite rule.

The fact that during the distillation of coal a low temperature favours the production of paraffin, and a high temperature that of aromatic hydrocarbons, appears, in the authors' opinion, to establish the connection between the various substances found according to the following scheme:

PENTANES AND HEXANES.

$$C_5H_{10} \longrightarrow C_2H_4 \longrightarrow$$
$$+ \qquad +$$
$$CH_4 \qquad C_3H_6$$

naphthenes (alicylic hydrocarbons) → higher benzene homologues → lower benzene homologues → benzene → (diphenyl) → naphthalene → anthracene → carbon and gas.

On this basis, therefore, it may be expected that the amount of loss on acid-washing would be inversely proportional to the quantity of aromatic substances present, and that the quantity of benzene and toluene found would be inversely proportional to one another. Very few of the crude benzols examined by the authors conformed to the general definition for crude benzols—viz., that they should distil over up to 170° C. Most of them contained a considerable proportion of naphthalene. For the purpose of the paper, therefore, the fraction up to 170° C. obtained in the laboratory is taken as representing a crude benzol as it should normally be produced. If the quantities of benzene, toluol, and xylene found in the fraction up to 170° C. be plotted against the loss on acid washing of this fraction, it is seen that the two main constituents do actually occur in their inverse connection with one another; and when these are added together and combined with the figure of zylene, the total aromatic substances in that fraction show a remarkably constant inverse relationship with the acid washing.

It might be a daring suggestion that the loss on acid washing may be taken as a measure of the three aromatic substances present in such a sample, yet the startling regularity of the plotted line, in the authors' opinion, almost compels its acceptation. From the figures, it appears that the phrase "loss on acid washing" should be precisely defined in meaning, as there is a considerable difference between the loss occurring after chemical treatment and the total treatment after including the subsequent distillation.

THE COLOUR TEMPERATURE OF ILLUMINATING GAS-FLAMES.

By E. F. Kingsbury.

[A Note from the Physical Laboratory of the United Gas Improvement Company to the "Journal of the Franklin Institute."]

It is of considerable importance in the photometry of gas-flames to know their colour temperature, because it determines the efficiency at which incandescent electric lamps must run to match them in colour.

While the colour temperature of the ordinary illuminating gas-flames has been known approximately for a long time, recently the question of its variability with the quality of gas and the flame size arose. So the following data may be of interest. Each flame was matched against a carbon lamp whose efficiency was accurately known at several voltages. Using the data on colour temperature given by Hyde and Forsythe in the March "Institute Journal," * these matching voltages have been evaluated in terms of temperatures:

Colour Temperatures of Various Gas-Flames.

Source.	Lamp Voltage (E.T.L. No. 4621).		Colour Temperature ° K.
1. Coal gas, full flame	111·0	..	2075
2. Coal gas, half turned down	107·5	..	2035
3. Water gas, full flame	115·4	..	2118
4. Water gas, half turned down	105·5	..	2015
5. Water gas, full flame, edge on	111·5	..	2080
6. Mixed gas, full flame	113·5	..	2095
7. Coal gas, full flame	113·8	..	2100
8. Coal gas, candle-shaped flame, height of Hefner	97·0	..	1940
(Reference points)			
9. Pentane lamp	93·5	..	1914
10. 4·85 W.P.M.S.C.P. carbon	110·4	..	2070
11. 3·73 W.P.M.S.C.P. carbon	118·8	..	2153
12. Hefner	88·0	..	1875

Nos. 1 to 6 inclusive were using an 8-ft. Von Schwarz excavated head lava tip; No. 7 was with an 8-ft. Bray union-jet tip, and No. 8 was with a ⅛-in. open tube; Nos. 9 to 12 were taken as references from the paper referred to. The coal gas was 8 to 9 candle power and 575 B.Th.U.; the water gas, 27·5-candle power and 690 B.Th.U.; the mixed gas experimented with, 25-candle power and 665 B.Th.U.

As is to be expected, the colour temperature of a flame is within certain limits dependent upon its shape, size, position, and composition of the gas. It will also vary in different parts of the flame—the values given above being integral over the entire surface. It will be noted the full flames are slightly whiter than the ordinary 4 W.P.H.C.P. carbon standards. Their colour temperature of 1870° for the mixed gas-flame given by Hyde and Forsythe in the paper referred to is considerably lower than any of the above values, which represent extremes in illuminating gas characteristics.

* See "Journal," Vol. CXXXVIII., p. 65.

Société Technique du Gaz "Transactions."

Military exigencies have not prevented the preparation of a substantial volume for the year 1916 by the Société Technique de l'Industrie du Gaz en France; but, of course, the book does not consist solely of "transactions," properly speaking. There is a verbatim report of the proceedings at the annual general meeting which was held in Paris on June 9 last year; and the Committee reports include one on the distillation of wood. This is followed by the Government decree recognizing the Société as an organization of public utility, and by the rules. Members will find useful a list and references, arranged in order of subjects, of articles which have been dealt with in the Société's bibliographical review from 1908 to 1910 inclusive, as well as the tables of contents, placed in order of date, of the legal review contained in the reports up to the 1914 congress. These matters take some 200 pages; and a like amount of space is occupied by lists of members (both in alphabetical sequence and under the names of their towns), the names of those who have passed away, a brief account of the Société's doings in the period from 1874 to 1916, the names of officers and committee members for each year between these dates, and lists of the gold medals bestowed on inventors and of prizes awarded to workmen and other employees in the industry since the foundation of the Société. Considering the circumstances, the volume represents a really large amount of work on the part of those concerned. At the close of the war a "Livre d'Or" will be prepared by the Société, giving the names of the members of the French gas fraternity who have fallen victims to the war—killed, wounded, died of wounds, prisoners, and missing—as well as those who have received military decorations or been mentioned in despatches. On Oct. 1, 1916, these lists comprised 1654 names.

CORRESPONDENCE.

[We are not responsible or opinions expressed by Correspondents.]

The Elimination of Tar Fog.

Sir,—In your last issue, when describing the Fisher-Fiddes patent extractor, I read with surprise the statement "that those of the 'P. & A.' type quickly block-up and become inefficient."

Now I venture to think that I have had a more extended experience with "P. & A." tar-extractors, both in the original form and with subsequent modifications, than perhaps any other British gas engineer. I have erected scores of them on the Continent, and do not consider a gas-works properly equipped unless extractors are fitted; and I have never experienced a single instance, except one, where they have failed to fulfil their duty of completely removing "tar fog." It is astonishing the time they will work without cleansing or attention.

The only failure I can call to mind was in the case of a new and excellent machine I sent from the Continent to a London suburban gas-works, which, after working a few months, was sent to the scrap heap. On investigating the matter, I found that the most appalling ignorance had been shown in the fixing and in the position of the machine.

The enclosed type of machine (placed on the market by Messrs. Holmes & Co., of Huddersfield) is an excellent type, and only recently has been put to severe tests by myself.

At our low-temperature carbonizing works at Battersea, where we naturally produce very rich and tarry gases, especially from shales and cannels, we had much difficulty, in spite of almost excessive condensation, in preventing tar deposits choking the vacuum pump. But since the erection of the Holmes "P. & A." extractor, which works under a vacuum of over 20 inches of mercury, every trace of tar fog is removed and the vacuum pump is not affected.

If there has been any failure in types of "P. & A" extractors, it can be traced: (1) To the machine being erected in the wrong place; and (2) being too small for the work it is required to do.

F. D. Marshall.

19, *Queen Anne's Chambers, S.W.*

P.S.—My view is that the "P. & A." types will work better under vacuum than under pressure.

[The experience of Mr. Marshall is interesting, and it "hits straight from the shoulder" in favour of the "P. & A." extractor. The hints as to the causes of inefficient working will probably be useful to engineers who are experiencing trouble. That the trouble is not confined to this country is seen from an article in our columns on June 12 [p. 519], headed "A Comparison of Operating Results at Twenty Gas-Works in Illinois." In the course of the information supplied, it is stated: "Frequently the supply of water to the condensers was insufficient; and the 'P. & A.' apparatus was bye-passed on account of back-pressure." The high standard of tar fog removal now required, though always desirable, has been brought about by the introduction of the oil-washing process.—Ed. G. J.]

Adulteration of Gas Coal.

Sir,—No gas engineer is likely to question the accuracy of the references made by yourself and correspondents to the general quality of the mineral now being supplied under the title of "Gas Coal." Apart from the financial considerations involved in the purchase of worse than useless mineral matter at 30s. or so per ton, it is attended with increased difficulty all round, from the mine to the retort-house. The labour incidental to loading and unloading, the rail and road haulage, the carbonizing, and the attention to the retort-furnaces are all more than proportionately increased—and this at a time when we are urgently requested, as a national duty, to cut-down all these items to the lowest practicable point.

In this connection, I would like to ask if others besides myself have been troubled with pitchy deposits at any point between the condensers and scrubbers, to an extent that was unknown in pre-war days. This is possibly due to the higher heats and fiercer firing necessary to get anything like a decent make of gas per ton of coal carbonized. At any rate, it occurs to an extent that excludes mere chance or accidental happening. Condensers and scrubbers, or the connecting pipes, that formerly ran several years without attention, now require a thorough clean-out every summer. In one instance, notwithstanding a foul main of ample capacity and length, laid in accordance with the plan that I adopted many years ago, with a fall towards, and into, the hydraulic main, which has answered excellently for 25 years or so, trouble was traced to pitchy deposits in the exhauster connections—quite a new experience. In another instance, excessive back-pressure was traced to clogging of the wood grid packing in a scrubber that was thoroughly cleaned last year. The necessary labour is extraneous, not suited to women or substitutes; there is difficulty in getting it done at any price; and the time lost by standing-off for cleaning means a loss of what is admitted by the Government to be valuable fertilizing material. Obviously, the adoption of tar or oil washing has nothing to do with the trouble, as it occurs previous to that treatment.

The question of the quality of a coal, as regards percentage of mineral content, apart from that of comparative values of various descriptions, calls for full consideration in connection with all matters affecting transport and labour, and especially the reduction of average mileage, by compelling gas undertakings to use the nearest local coal. The conveyance of coal from Durham to South Wales has been cited as an awful example. If all kinds of coal were approximately equal in gas and coke yielding properties, no matter where raised, the suggestion that a *pro ratâ* reduction of average mileage means an equivalent relief to transport traffic might hold good. But as things are, it is an utter fallacy; and if put in force, without fair consideration of all local

conditions and circumstances, it will not only tend to defeat the object in view, but it will amount to an additional infliction on the already long-suffering gas industry—in some cases of a magnitude exceeding others that it has been called upon to endure the last three years.

It is possible that in some cases the long distance preference is simply due to prejudice. But there is not much room in these days for a man at the head of affairs who cannot figure in hard-headed £ s. d.; and I venture to claim that, as a general rule, the coal for gas making is purchased on well-matured considerations and comparisons as to actual intrinsic value, in which the bare cost is a mere incident. Such things as yield and quality of gas and coke must not be overlooked; and it is especially necessary to "humour" labour to the greatest practicable extent. Even on financial considerations only, the rights not only of the undertaking but of the consumers of gas should not be overlooked. But if these have to give place to urgent national necessity, the manager may be brought to the verge of a complete breakdown, by being forced to use an inferior local coal that reduces the make per ton 20 or 25 p.ct.; will not give a coke suited to its own carbonization; overtaxes a plant attenuated by long-deferred renewals; and upsets the highly tensioned labour question. It may add to the shortage of coal in general the not much less trouble of shortage of the proper kind; and any reduction of transport in the way of shorter average mileage will be largely discounted by increased tonnage, as the cost of coal conveyance is a matter of weight, irrespective of quality. Any interference with free choice in selection of the coal to be purchased requires consideration from many points of view, other than the bare reduction of average mileage.

Salisbury, July 7, 1917. N. H. HUMPHRYS.

Sulphuric Acid.

SIR,—Dr. Addison is reported to have said in the House of Commons, in his speech on the 28th ult., that the sulphuric acid producing capacity of the country has been increased to more than fifteen times what it was before the war, while it is being produced at much less cost.

No doubt you have noticed this; and those who have to pay two to three times as much now as in pre-war days will naturally want some more information on the subject.

Can you, or any of your readers, offer any explanation as to what Dr. Addison meant by saying that acid was now being made at less cost?

155, *Norfolk Street, Sheffield,* RICHARD JONES.
July 3, 1917.

REGISTER OF PATENTS.

Removing Carbon Deposit from Retorts.

No. 106,910.

BARK, W. T., of Tenterden, Kent.

No. 11,830; Aug. 21, 1916.

The means proposed for effecting the removal of carbon deposit is to provide a retort lid having an opening (valve controlled) at or near the bottom of the retort to admit air. In alignment with, and in continuation of, this opening in the lid is an air-duct, of refractory material, which terminates short of the end of the retort, so that when the ascension pipe at the charging end is opened a current of cold air is created which traverses the air-duct, issues at the end, returns along the retort, and finds an exit by the ascension pipe. This "fresh air supplies oxygen to the heated carbon deposit on the walls of the retort, causing combustion, so that it burns away in the form of gas which passes out at the top of the ascension pipe."

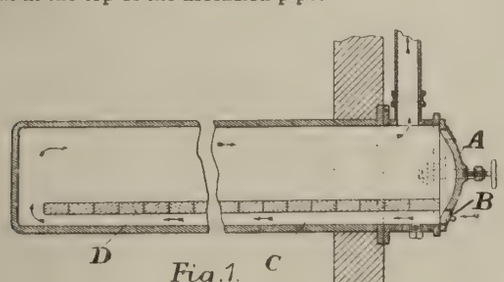
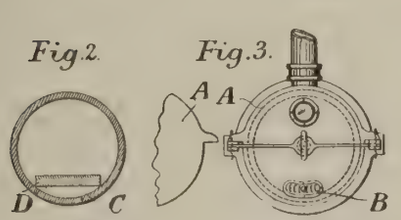


Fig. 1.



Bark's Retort-Carbon Remover.

Fig. 1 is a vertical longitudinal section of a retort; the ordinary lid being removed and a separate loose lid having an air opening according to the present invention hung in its place. Fig. 2 is a vertical transverse section. Fig. 3 is a front end elevation.

According to the preferred form of the invention a loose or supplementary lid A is provided for the retort having an opening B near the bottom controlled by a valve designed to admit a supply of air. In continuation of the opening in the lid is (within the retort) an air-duct C. The supplementary lid is intended to be used on any retort in which it is desired to burn-off the carbon deposit.

The air-duct is formed by a horizontal partition D of refractory material, which terminates short of the inner end of the retort. The duct is constructed of sectional slabs of refractory material extending across the bottom of the retort and leaving an air-way beneath as shown, and "they can be readily pushed into place from the mouth of the retort."

Coin-Operated Gas-Meters.—No. 106,911.

WILSON, J. H., of Coventry, and WILSON, G., of 's-Gravenhage, Holland.

No. 11,845; Aug. 21, 1916.

This invention has for its object to provide a device for receiving two or more coins of different value to secure a proportionate supply of gas. The mechanism comprises a rotatable receiving-member in the form of a drum or plug having slots in it to receive the coins. The connection between the drum and the meter mechanism is effected by the coin itself, which partly projects from the slot in the drum and enters the teeth of another rotatable part constituting the setting member for the meter. The rotatable coin-receiving member has a receiving channel or slot provided with means for retaining a larger coin at its upper or feeding-in end, but which means will allow a smaller coin to pass to the bottom end. The ends are disposed in such relation to opposite sides of the toothed setting-member that the two coins will engage the member at different points; so that the receiving member when rotated will travel a greater or smaller distance before discharging the coin, according to whether a large or small coin is engaging the setting member.

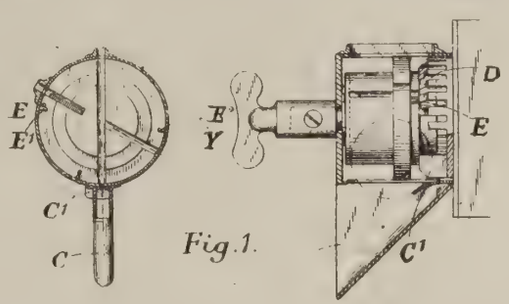
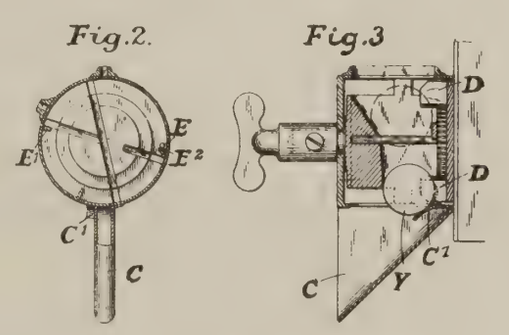


Fig. 1.



Wilson's Two-Price Prepayment Meter.

Fig. 1 is a side elevation and section of the coin-receiving mechanism with the setting member—the enclosing casing being in section for the sake of clearness. Fig. 2 shows the interior movable plug in a different position. Fig. 3 is a similar view, but with the inner plug in section along the shilling and sixpenny slot with the parts in position for discharging the sixpence.

The operation of the device is as follows: When a coin is to be placed in the slot, the plug is turned as far as it can be in the counter-clockwise direction, so that a pin E on the plug is brought against a pin E^1 on the casing. If a penny is then dropped into the slot it will fall to the bottom, but will be prevented from leaving the casing by a lip C, which makes the lower part of the discharge-aperture too narrow for it to pass. The penny will project from the face of the plug and enter between two of the teeth D of the setting-up member, so as to lock the plug. If, now, the plug is turned in a clockwise direction, the penny will be carried along, and the setting-member with it, until the lowest part of the penny which projects down into the delivery-orifice is brought against an inward projection on the casing at the end of the discharge-aperture. This checks the movement of the plug, and directly the operating-handle is released the penny will drop through the discharge-opening at the side of the lip C, and will so fall into the collecting chamber. This movement of the plug will have effected the movement of the setting member the distance of one tooth, and gas will be delivered to the value of 1d. If any coin smaller than a penny is placed in the slot when the parts are in the position first shown, it will not be retained by the lip C, so that it will drop into the trough below, which extends forward to an opening in the front of the meter, so that the coin will be returned to the consumer.

If a shilling is placed in the slot, it remains at the top, because the lower part of the slot is too narrow to accommodate it. The shilling thus engages the teeth of the setting-device at a point which is at a considerable angular distance from the discharge outlet for the shillings. The plug therefore has to be turned through an angle of nearly 180°, so that the parts are brought to the position shown in fig. 2, when the shilling drops out through the aperature in the casing and the setting device has been rotated through an angular distance which will ensure a quantity of gas equal in value to 1s. being delivered. The plug is

prevented from being turned beyond the discharge-position for the shilling by the pin E being brought against a pin E^2 on the casing.

If a sixpence is placed in the slot, this will drop to the bottom of the slot as shown at Y, where it is arrested by the casing; but it will engage the teeth D of the setting-member, and thus, when the plug is turned, it will cause the setting-member to be carried forward until the sixpence is brought against a stop, when it will drop through the delivery-opening. The sixpence is carried over the return shoot C in the same way as the penny, as the space provided between the back of the slot A and the lip C is not sufficient to allow the sixpence to drop until the lip has been passed. The distance through which the plug is moved for a sixpence is half that through which it is moved for a shilling; so that a corresponding proportion of gas will be supplied.

Diaphragm for Gas-Meters.—No. 106,991.

SMITH, E. W., of Kennington Park Road, S.E.

No. 7183; May 18, 1917.

This invention relates to a form of diaphragm in which a metal plate or disc is mounted upon flexible material, usually leather, with the object of strengthening the diaphragm by increasing the rigidity of the metal plate by forming it with radial ribs or corrugations extending the greater part of the distance from the centre to the edge of the plate.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 4.]

Nos. 9071—9495.

BENTLEY, J. E.—"Automatic gas or fluid governors." No. 9387.
BOLTON, D. C.—"Gas-turbines." No. 9150.
CALVERT, G.—"Manufacture of cyanide and cyanogen compounds." No. 9379.
CHRISP, G.—"Effecting continuous absorption of a gas or some constituent of a gas by means of a solid absorbent." No. 9211.
COWEY, L. E.—"Means for measuring the rate of flow of liquids." No. 9484.
CUTLER, S.—"Manlids for gasholders." No. 9324.
DRAKE, J. W., and DRAKES, LTD.—"Apparatus for removing coke discharged from retorts or furnaces." No. 9188.
GOWER, H.—"Gas-lighter." No. 9158.
HUTCHINS, T. W. S.—"Retorts or furnaces for the destructive distillation and carbonization of carbonaceous materials." No. 9234.
KOPPERS, H.—"Door for furnaces, retorts, &c., for producing gas, coke, &c." No. 9402.
SOMERVILLE, J. M., and the SOUTH METROPOLITAN GAS COMPANY.—"Apparatus for washing gas or for impregnating liquids." No. 9282.
TAYLOR, G.—See Chrisp. No. 9211.
WATTS, C. J.—"Gas-heated radiator or stove." No. 9400.
WEBB, A. M.—"Liquid and gas contact apparatus." No. 9452.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Provisional Orders Bill.

The Gas and Water Provisional Orders Bill was brought from the Commons, read the first time, and referred to the Examiners.

Sheffield United Gas Company's Bill.

This Bill, promoted by the Sheffield Gas Company, was in a list of Opposed Bills which came before a Committee of the House of Lords last Tuesday, presided over by Earl Kintore. During the day, however, it became known that the opposition of the Sheffield Corporation, who were the only opponents, had been withdrawn, and that the Bill was to be sent to the Unopposed Bills Committee. The measure has already passed the House of Commons, when the Corporation refused to discuss clauses after the Committee had found the preamble of the Bill proved. We understand, however, that with the exception of a new clause regarding the breaking-up of roads, which has been agreed with the Corporation, the Bill remains in the same form as when it left the House of Commons.

HOUSE OF COMMONS.

The Lighting Restrictions.

Mr. HINDS asked the Home Secretary whether he would announce at an early date the intentions of the Government as to lighting restrictions during the coming autumn and winter; and whether, in the event of the restrictions being renewed, it would be found practicable to fix settled monthly times for darkening throughout the country as in London, instead of daily alterations regulated by the sunset hour.

Sir GEORGE CAVE replied that an announcement with regard to the lighting restrictions during the autumn and winter would be made in due course, if any modification of the existing orders was considered desirable. He would consider the suggestion in the latter part of the question.

In connection with the newly-installed ammoniacal liquor plant at Stockport, the Engineer recently reported to the Gas Committee that a small quantity of sulphate of ammonia was now being produced and sold to allotment holders and private gardeners in the district.

LEGAL INTELLIGENCE.

LIGHTING CONTRACTS AND THE WAR.

An action which was declared by the Judge to be indistinguishable in principle from the well known one decided by the Court of Appeal, of the Leiston Gas Company *v.* Leiston Urban District Council, came before Mr. Justice Bailhache in the King's Bench Division last Tuesday, when the Wycombe Borough Electric Light and Power Company, Ltd., successfully sought to recover from the Wycombe Corporation a sum of £1290 under an agreement to supply electricity for the public lighting of the borough. On the other hand, the Corporation contended that they were entitled to a sum in excess of the amount claimed, in consequence of the lamps remaining unlighted; and they counterclaimed for the deduction of whatever might be necessary.

Mr. POLLOCK, K.C., M.P., explained that the action was brought to recover instalments due under an agreement, dated Oct. 3, 1911, made between the Company and the defendants; and the point was whether or not, in a case where the lighting had been restricted by orders under the Defence of the Realm Regulations, the plaintiffs were entitled to recover the quantum which was due to them under the agreement, or whether the defendants were entitled to say that the agreement had been put an end to by the circumstances which had arisen, and that the quantum upon which payment was based was no longer applicable, because, in fact, the amount of light contemplated by the agreement had not been delivered. The Corporation relied on a penalty clause in the agreement which provided:

> In case of any default in lighting the lamps or any of them, or if the same shall remain unlighted or be suffered to go out during the times in which the same ought to be lighted, as aforesaid, from any cause whatever, the Corporation shall be at liberty to deduct from any payment to be made the sum of 3s. per night for each of the arc lamps and the 800 c.p. lamps, and the sum of 8d. per night for other lamps in respect of which such default or negligence shall be made or incurred, or which shall so remain unlighted or be suffered to go out, provided always in case any deficiency or default shall take place in lighting lamps notice shall be given in writing and left at the office of the works within 48 hours after such deficiency or default has occurred.

No such notice was, however, given in this case to comply with the penalty clause. The facts were really agreed between the parties.

Mr. MATTHEWS, K.C. (on behalf of the Corporation), submitted that this action was not governed by the Leiston case. In the latter there was no right to demand certain sums of money in the event of failure to light. He argued that the contract was divisible; and the defendants were only liable to pay for the lamps which were lighted.

His LORDSHIP said the Corporation were not only paying for light, but for a good many other services and accessories. He was satisfied that the words in the penalty clause "from any cause whatever" were limited to causes in which there had been some default or negligence on the part of the Company. This being so, there was no distinction between the present case and that of the Leiston Company. Judgment would therefore be for £1290, with interest at 4 p.ct. until payment—notice of appeal to be given within fourteen days.

Spurious "Nico" Mantles.

At the Guildhall, on Monday of last week, before Alderman Sir John Baddeley, Bernard Usick, wholesale gas-mantle manufacturer, of Hornsey, was summoned under the Merchandise Marks Act, 1887, for having unlawfully had in his possession for sale inverted gas-mantles to which the registered trade mark "Nico" had been unlawfully applied. There were three other summonses for having in his possession mantles to which a false trade description had been applied, and for having sold such goods. Mr. Travers Humphreys, for the prosecution, which was instituted by the New Inverted Gas-Lamp Company, said the defendant offered the prosecutors some mantles for sale which he said were their own mantles. It was no uncommon thing in the trade for mantles to get into the hands of dealers, who subsequently offered them back to the manufacturers. When the defendant delivered the mantles marked "Nico" to the prosecutors, they at once saw they were not genuine, but of inferior make. The defendant was asked to explain how he became possessed of them, but refused to answer any questions. Inquiries were made, and summonses were applied for and served upon the defendant, who then went to the prosecutors and asked them to withdraw the proceedings, offering to give them the information they required. He had since given all information as to where he bought the mantles, the price he paid, &c.; and so, the object of the prosecutors having been attained, he (Mr. Travers Humphreys) asked permission to withdraw from the prosecution. Sir John Baddeley said, as the defendant had made full amends and given every satisfaction to the prosecutors, and as it was not an offence against the public but against the individual, he would accede to the application and allow the summons to be withdrawn.

Islington Public Lighting.—The Islington Borough Council have been notified by the Gas Light and Coke Company that, from the date of recording meter-indices for the Midsummer quarter, the price of gas supplied to street-lamps (except where a fixed annual charge is made under contract) will be increased by 5d. per 1000 c.ft.—*i.e.*, from 2s. 8d. to 3s. 1d.

The "Price of Gas at Doncaster."—With reference to the paragraph that appeared on p. 638 of the "JOURNAL" for the 26th ult., purporting to deal with a proposal to increase the price of gas at Doncaster (and which was the subject of a contradiction by Mr. Robert Watson in our last issue), the correspondent who was responsible for the item says that the place named should have been Dewsbury, and not Doncaster.

DIRECTIONS
OF
THE CONTROLLER OF COAL MINES,
Dated 4th July, 1917,
FOR THE PURPOSE OF RE-ORGANIZING THE
TRANSPORT OF COAL BY PUBLIC RAILWAY FOR INLAND CONSUMPTION.

Issued under Section 3 of the Coal Transport Order, 1917, made by the Board of Trade under Regulations 2 F. to 2 J.J. and 9 G. of the DEFENCE OF THE REALM REGULATIONS.

(1) No person shall, after the 8th September, 1917, without the consent of the Controller of Coal Mines, buy or sell, or offer to buy or sell, coal to be forwarded by public railway for inland consumption to any area other than those to which the coal in question may be so forwarded under the Coal Transport Re-organization Scheme, as set out in these directions.

(2) For the purposes of the aforementioned scheme, Great Britain has been divided into areas numbered from 1 to 20 on two maps* of England and Wales and of Scotland respectively, and the following table shows the areas to which coal produced in each of the areas specified in the first column may be forwarded by public railway for inland consumption for the purposes indicated in the second, third, and fourth columns.

Area of Production.	Areas to Which the Forwarding of Coal by Public Railway for Inland Consumption is Confined by these Directions.		
	Steam and Manufacturing.	Gas and Cokeing.	House.
No.	Area No.	Area No.	Area No.
1. Northumberland	1, 2, 3.	1.	1, 2.
2. Cumberland	2.	2.	2.
3. Durham	2, 3.	2, 3.	2, 3.
4. Lancashire	4, 6.	4.	4.
5. Yorkshire	3, 4, 5, 7, 8, 10, 11, 14, 16.	4, 5, 7, 8, 10, 11, 13, 14, 16.	4, 5, 7, 8, 10, 11, 14, 16.
6. North Wales	6.	6.	6.
7. North Stafford	6, 7, 9.	7, 9, 10.	6, 7, 9.
8. Eastern Counties	—	—	—
9. Shropshire	9, 12, 13.	9, 13.	9, 12, 13.
10. Birmingham and District	9, 10, 11, 13, 14.	—	9, 10, 11, 13, 14.
11. Northants to Essex	—	—	—
12. South Wales and Monmouthshire	12, 13, 14.	12.	12, 13.
13. South Western Counties	13.	13.	13.
14. South Eastern Counties and London	14.	14.	14.
15. Derby and Nottingham	4, 6, 7, 8, 10, 11, 13, 14, 15, 16.	4, 7, 8, 10, 11. 14, 15, 16.	4, 6, 7, 8, 11, 14, 15, 16.
16. Leicester	10, 11, 14, 16.	—	10, 11, 14, 16.
SCOTLAND.			
17. South Eastern	17.	17.	17
18. North Western	18.	18.	18.
19. North Eastern	17, 18, 19.	19.	17, 18, 19.
20. South Western	18, 20.	20.	20.

(3) In accordance with the provisions of Sections 2 and 3 of the Coal Transport Order, 1917, every contract for the sale of coal is hereby abrogated as from 6 p.m. on the 8th September, 1917, in every case in which this is necessary, in order that the re-allocation of the supplies of coal, as provided for in clause 6 of these directions, may be effected.

[On and from September 10th, new contracts for the sale of coal affected by the scheme will come into operation, and all necessary arrangements to this end must be completed not later than September 8th, but it is obviously desirable that completion should be reached as much in advance of that date as possible.]

(4) Every Colliery Owner shall, on receipt of instructions from the District Coal and Coke Supplies Committee in whose area the Colliery is situated, furnish the Committee with returns giving the following information as respects forwardings by public railway, for inland consumption during June, 1917, of each description of coal produced at the Colliery :

(*a*) In the case of coal sold direct to consumers or retail merchants, the name and address of the consumer or retail merchant, and the tonnage of each description forwarded by rail to each in the area specified by the Committee, for each of the following purposes : (*a*) Steam-raising and Manufacturing, (*b*) Gas-making, (*c*) Coke-ovens, (*d*) Household use.

(*b*) In the case of coal sold to factors and wholesale merchants, the name and address of the factor or wholesale merchant and the tonnage of each description forwarded by rail to each in the areas specified by the Committee, for each of the following purposes : (*a*) Steam-raising and Manufacturing, (*b*) Gas-making, (*c*) Coke ovens, (*d*) Household use.

(*c*) In the case of every consignment of coal during June, the destination of which was unknown to the Colliery Owner, the name, address, and business of the purchaser and the weight and description of each consignment.

(*d*) Such information as to the provision of wagons as the Committee may require.

Every Colliery Owner shall furnish the above returns to the District Coal and Coke Supplies Committee, so as to be in the hands of the Committee within seven days of the date of the despatch of the instructions by the Committee to the Collieries in their area.

(5) In every case in which the area of consumption of coal sold to a factor or merchant is unknown to the Colliery Owner, the District Coal and Coke Supplies Committees will apply to every such factor or merchant for a statement giving, as respects such coal, the tonnage of each description forwarded by rail for consumption in each of the areas as referred to in clause 4 of these directions, for each of the purposes named therein (*a*) Steam-raising and Manufacture, (*b*) Gas-making, (*c*) Coke-ovens, (*d*) Household use, and every such factor or merchant shall furnish such return to the Committee so as to be in their hands within three days of the date of application.

In cases where coal is sold by one factor or merchant to another, and the area of consumption of the coal is unknown to the seller, the seller shall state on the above-mentioned return the name and address of the purchaser and the weight and the description of coal in each case.

(6) On receipt of the returns specified in clause 4, the District Coal and Coke Supplies Committees will arrange for meeting the requirements of purchasers whose supplies have been affected by the Scheme, out of the tonnage of coal which will be available and sufficient for the purpose, by diversion from other areas under the operation of the scheme. This tonnage will consist of the following :

(*a*) The tonnage of coal hitherto forwarded by public railway from the areas specified in the first column of the table shown in clause 2 of these directions, to areas other than those specified in the second, third, and fourth columns as permissible areas for the coal in question.

(*b*) Such portion of the tonnage hitherto forwarded to other areas as it may be necessary for the Committee to divert under detailed instructions from the Controller of Coal Mines.

The District Coal and Coke Supplies Committees will inform each of the Colliery Owners in their area of the tonnages (if any) to be diverted from these areas, and will specify the factors, merchants, and direct consumers, whose supplies are to be reduced or discontinued, with the descriptions and quantities of coal to be diverted from each.

[*Continued on next page.*]

* Copies of these maps, also a diagram illustrating the effect of the Scheme on the Area interchanges have been prepared by the Railway Clearing House, and may be obtained, with a pamphlet embodying full instructions, by all concerned, post free, on application to the Secretary, Railway Clearing House, 123, Seymour Street, London, N.W. 1.

(7) The whole tonnage of coal diverted under the operation of the scheme as mentioned in clause 6 shall be reserved by the Collieries for disposal in accordance with instructions to be given by the District Coal and Coke Supplies Committee, who will notify each Colliery Owner in their area of the factors, merchants, and direct consumers to whom the coal is to be supplied after the 8th of September, 1917, and of the descriptions and quantities to be supplied to each.

(8) The Collieries will then communicate direct with the factors, merchants, and direct consumers allotted to each, and in offering the authorized weight and description of coal will, at the same time, state whether wagons can be supplied by the Colliery. If the Colliery is unable to provide wagons or can provide only a portion of them, this must be stated when offering the coal, and the factors, merchants, and direct consumers asked if they can provide wagons.

In cases where factors, merchants, and direct consumers state they are unable to provide wagons, the Colliery must at once notify this, with full particulars, to the District Coal and Coke Supplies Committee, who will then endeavour to arrange for supplies of wagons, and if unable to do so, report the circumstances to the Controller of Coal Mines. It must, however, be understood that where factors, merchants, and direct consumers are to-day providing the wagons for the existing supplies which are to be discontinued as from the 8th September, under the instructions of the District Committee, they must continue to provide wagons for the new supplies substituted by the Committee, except in cases where the Collieries indicate their ability to meet demands with their own wagons or those of railway companies.

(9) Every colliery shall notify all factors, merchants, and direct consumers to whom coal has been sold, the delivery of which will be affected by the scheme, of the discontinuance or reduction of supplies as from the 8th September, 1917. Such notifications shall be made :

(*a*) In the case of coal forwarded to areas prohibited under clause 2 of these directions, as soon as possible after the publication of these directions :

(*b*) In the case of coal forwarded to other areas in reduced quantities, as soon as possible after the receipt of instructions from the District Coal and Coke Supplies Committee as to the factors, merchants, and direct consumers whose supplies will be affected.

(10) These directions are designed so as to leave the initiative with the District Coal and Coke Supplies Committees. Factors, merchants, and direct consumers whose supplies after the 8th September, 1917, are affected by the scheme are not to apply to Collieries for supplies in substitution, but must wait until they receive communications from such Collieries as are instructed by the District Coal and Coke Supplies Committees to provide the supplies required under the scheme. Provided that if any factor, merchant, or direct consumer does not hear from a Colliery or Collieries respecting such supplies as affected under the scheme by August 27th, a communication shall at once be sent to the District Committee controlling the area responsible for supplying such factor, merchant, or direct consumer, furnishing details of the quantities and description of coal required, together with the names of Collieries from whom such supplies were actually drawn, and would continue to be drawn up to 6 p.m. on September 8th, 1917. Also that if a Colliery has not, by August 20th, 1917, received particulars of the allocation of its coal which is being displaced under the scheme it shall, on that date, communicate with the District Coal and Coke Supplies Committee concerned.

(11) The Controller of Coal Mines will furnish the District Coal and Coke Supplies Committees with information regarding the present distribution of certain special descriptions and qualities of coal which are required for certain purposes, such as for coke ovens, gas producers, and automatic stokers, and the names of firms who are entitled to priority in respect of their requirements of such fuel. Such firms will receive certificates issued by the Controller of Coal Mines entitling them to receive specified supplies of the special fuels mentioned in the certificate, and the Committees will take steps to provide the fuel in question, by diversion, where necessary, from firms who have not received certificates.

Every person shall comply with the instructions of the District Coal and Coke Supplies Committees with regard to the distribution of descriptions and qualities of coal, which it may be necessary to deal with, as special fuels under this clause.

(12) These directions do not affect :

(*a*) Coal conveyed to a port for shipment, whether for export, coastwise, or bunkers.

(*b*) Coal conveyed otherwise than by public railway from the Colliery.

(*c*) Anthracite.

In the case of rail-borne coal transhipped for delivery by barge or to be delivered by road vehicle, the point to which the traffic is forwarded by public railway is to be regarded as the destination for the purpose of complying with these directions.

(13) These directions may be revoked or varied by the Controller of Coal Mines as occasion arises.

GUY CALTHROP, Controller of Coal Mines.

EXPLANATORY NOTES.

The Scheme outlined in the foregoing Directions will, it is estimated, effect a saving in railway transport of not less than 700 million ton miles annually.

A.—Coal already being produced and consumed within the one area is ignored, and therefore it will not be necessary, as a rule, to interfere with existing contracts or sales affecting such coal.

B.—The District Coal and Coke Supplies Committees will deal with all coal affected by the scheme. There will be no need for factors, merchants, and direct consumers to take any steps under the scheme. They will simply wait until they are communicated with on the subject, except so far as the position is governed by clause 10 of the Directions.

C.—The District Committees, acting for the Controller of Coal Mines, have full powers to deal with the scheme as a whole, and are to be the medium for clearing up any doubtful points which may arise.

D.—As an organization designed to relieve transport, the scheme has been based on four main issues :

(1) That consumption of coal should take place as near the producing point as possible.

(2) That in view of the superior facilities, afforded by the main Trunk Lines, the movement of traffic should follow these routes wherever possible.

(3) That the movement of coal should, as far as possible, be in well-defined directions—viz. : North to South, North to South-East, North to South-West, East to West.

(4) That an area producing less coal than suffices for its own needs should not send any portion of its output to other areas. That an area producing more coal than it requires for consumption within the area itself, should only distribute the balance to adjacent or convenient areas.

E.—The only limitation in regard to the foregoing clause (4) is the need for providing coal of a special type for certain purposes (this need has been determined by getting in touch with consumers direct), and is referred to in clause 11 of the Directions.

F.—All concerned are strongly advised to secure a map, diagram, and pamphlet as indicated in the footnote to clause 2 of the Directions, as these documents will be found to be of material assistance.

G.—It is emphasized that this scheme does not affect waterborne coal, either export, coastwise, or bunkers, anthracite or coke of any description.

H.—A List of the District Committees governing the various areas, together with the names and addresses of Secretaries, is appended :

No.	Area.	Secretary of District Coal and Coke Supplies Committees.
1.	Northumberland	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
2.	Cumberland	T. P. Martin, Esq., 19, Falcon Street, Workington.
3.	Durham	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
4.	Lancashire	Sir T. R. Ratcliffe Ellis, 18, King Street, Wigan.
5.	Yorkshire	
	South Yorks Collieries	Messrs. Parker, Rhodes, and Co., 14, Moorgate Street, Rotherham.
	West Yorks Collieries	A. B. Smith, Esq., Central Bank Chambers, Leeds.
6.	North Wales	W. H. Haswell, Esq., Elwy House, King Street, Wrexham.
7.	North Stafford	Major J. Selby Gardner, Cannock, Stafford.
8.	Eastern Counties	W. Saunders, Esq., Bank Chambers, London Road, Derby.
9.	Shropshire	Major J. Selby Gardner, Cannock, Stafford.
10.	Birmingham and District	Major J. Selby Gardner, Cannock, Stafford.
11.	Northants to Essex	W. Saunders, Esq., Bank Chambers, London Road, Derby
12.	South Wales	Finlay A. Gibson, Esq., Park Place, Cardiff.
13.	South-Western Counties	J. G. Dennehy, Esq., Albion Chambers, Bristol.
14.	South-Eastern Counties and London	W. Saunders, Esq., Bank Chambers, London Road, Derby.
15.	Notts and Derby	W. Saunders, Esq., Bank Chambers, London Road, Derby.
16.	Leicester	W. Saunders, Esq., Bank Chambers, London Road, Derby
	SCOTLAND.	
17.	South-Eastern Counties	R. Baird, Esq., 105, St. Vincent Street, Glasgow.
18.	North-Western Counties	
19.	North-Eastern Counties	
20.	South-Western Counties	

MISCELLANEOUS NEWS.

CO-PARTNERSHIP IN WARTIME.

The Case of the South Metropolitan Company.

Writing in the July issue of the "Co-Partnership Journal," Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company, makes the following remarks on the subject of the bonus:

The rate charged for gas during the past twelve months will entitle co-partners to be credited with a bonus of 3¾ p.ct. upon their salaries and wages during that period. Taking into account the fact that we have been just upon three years at war, this may be considered as not unsatisfactory; and this allotment of profits has certainly been richly merited by its recipients.

A very different state of things, however, comes into existence from to-day; for at the price to which gas has now been raised, the bonus will, for the time being, entirely disappear. Unfortunate though this be, we must extract what comfort we can by reflecting that it is quite in accord with the principles underlying our co-partnership and its bonus scale. Suppose, instead of applying co-partnership to an old one, we were starting and including it with a new gas company, how should we proceed? Having first ascertained that there was scope for a business to be built-up, and that there were possible consumers who would use our gas, the next step would be to invite people to provide money which we could use in the construction of works, the laying-down of mains and services, and the provision of stocks of coal, tools, &c. What interest should be allowed upon the money (or savings) put into our business? In the case of the South Metropolitan Gas Company, 4 p.ct. was the rate taken; and at this figure the price of gas was fixed at 3s. 1d. per 1000 c.ft. We also undertook to pay our workpeople the standard rate of wages. These three points—4 p.ct. dividend, gas at 3s. 1d. per 1000 c.ft. and current wages—formed the basis of the co-partnership between our shareholders, consumers, and employees. Let us suppose that, having got to work on the lines stated above, we found we were making more profits than sufficient to meet those obligations. We should apply the surplus, first in reducing the price of gas to consumers, and then using the balance to add to the dividend of the shareholders, and to pay a bonus to the employees. For every penny at which we sold gas below 3s. 1d., the shareholders would receive 2s. 8d. p.ct. extra in dividend and the employees a bonus of ¾ p.ct. on their wages.

When war broke out, gas was charged for at 2s. 2d. per 1000 c.ft., the shareholders were receiving on their investment a dividend of £5 9s. 4d. p.ct., and the officers and workpeople 8¾ p.ct. upon salaries and wages. Owing mainly to the greatly increased cost of coal delivered to the works (this has nearly trebled), the Board of Directors have been compelled to raise the price of gas to 3s. 1d. per 1000 c.ft.—a figure at which the extra dividend and the co-partnership bonus both disappear; and there is every likelihood of this condition continuing in force for another twelve months. How will our co-partners take this? Will they leave us and seek more remunerative employment elsewhere, or will they stay on, sharing losses with the Company as they have profits, and wait for the dawn of happier and more prosperous days? I have no doubt myself as to the result. I believe the roots of our co-partnership are too deep to be uptorn by a storm, passing though severe. I believe that the magnificent patriotism our co-partners have shown during the terrible times through which their beloved land has passed will be reflected on a lower plane in their attitude to the Company with which they are associated; for I believe they have pride in it and the good work it has been enabled through them to carry out. For the present, then, the bonus disappears; but all else of our co-partnership remains. And when the heavy clouds of to-day clear away, its sun will shine out purer and brighter because of the present period of storm and shadow.

It occurs to me that the reference to the retention of co-partners in our service might possibly be misunderstood. I need hardly say that nothing is further from my belief than the idea that the co-partner is in any way fettered by employment under co-partnership. The contrary is, of course, the case. From the most highly-placed official to the lowest-rated workman, all are perfectly free to place their services where these will be best acknowledged; and this is not incompatible, but in accord, with the principles of co-partnership.

Further on in the same issue of the "Co-Partnership Journal," there is a reply, which "adequately represents the other side of the case," to the references contained in Mr. A. E. Broadberry's recent Presidential Address to the Institution of Gas Engineers, on the subject of co-partnership under the test of war conditions. This reply, headed "Mr. Broadberry's 'Essential Features,'" is reproduced below.

We are interested in Mr. Broadberry's conception of co-partnership; for when a system is pronounced a failure, it is most important to ascertain the point of view of the person who has been disappointed. In Mr. Broadberry's mind, co-partnership "was a beautiful moral and sentimental idea, and appeared to have a sound material foundation." It "postulated," we are told, four essential features, the first of which was "security of employment for the worker." Whether it is fair to call this an "essential feature," we do not know; but undoubtedly co-partnership has a beneficial tendency in this direction. Mr. Broadberry, however, complains that employees have left his Company for higher wages elsewhere, and appears to think that this is a sign of failure. We do not admit for a moment that it is so. Co-partnership was not devised to hinder or prevent any working man who desired to better his position; and in the case of our Company it is certainly not so used—witness the number of men who have emigrated to the Colonies, taking their co-partnership accumulations with them. No proof whatever is given that co-partnership has failed to give "security of employment for the workers;" the complaint being in reality that it has not given security that workers shall remain with the employer. We suggest that, to obtain this result, co-partnership employers must keep their conditions of service as attractive as those of neighbouring industrial concerns, even in war-time.

The second "essential feature" of Mr. Broadberry's co-partnership ideal is stated to be "beneficial wage increase for good and effective combined work." Most co-partnership advocates would repudiate this definition. Profit-sharing is not meant to be regarded as "wage increase;" and a misconception of this kind is calculated to do a considerable amount of harm. The employee shares in the prosperity of the employer, due in a measure to his own efficiency and care; and if the profits of the concern fail by reason of war conditions, the co-partnership bonus may disappear for a time, though good and effective work has been done. But the worker is entitled in any case to the fair wages customary in the industry, altogether apart from any consideration of profit-sharing.

We agree with Mr. Broadberry that "accumulation of savings impossible with voluntary thrift" is a feature of co-partnership; but we are not inclined to believe it has failed in this respect, even at Tottenham. Mr. Broadberry says "there existed in many cases very considerable sums accumulated as the effect of co-partnership." This looks like success, not failure. But certain co-partners left for other employment; and Mr. Broadberry thinks, rightly or wrongly, that the handling of these accumulations was one of the inducements for their leaving. We venture to suggest that this accumulation of savings was really intended for the benefit of the co-partner, and not to keep him from leaving his employment to better himself. It may be urged that in the long run it will be proved that these men would have been wise to remain where they were, But that is beside the mark. Every man has a right to decide such matters for himself; and if a man is incapable of managing his own business, he is not of much use in the conduct of his employer's affairs.

"The unifying of all interests" is the fourth point taken up; and Mr. Broadberry dismisses it with the following cryptic utterance: "That it is impossible to co-ordinate what does not exist, requires no demonstration; and as in many cases no interest is left in co-partnership, this last point has not been upheld." We wonder what it is that "does not exist." "All interests" certainly do exist, and also the need for unification of them. Co-partnership exists, too; and in the Companies which have been administered by Sir George Livesey, and those whom his personality influenced and inspired, the principles of co-partnership have been potent in the direction of the unification of the interests of employer, employee, and consumer. Proof of this, and of the war-proof character of co-partnership as realized in South London, can be found in hundreds of letters from our brave co-partners, who so splendidly responded to the call of the greater co-partnership—their Nation—and who, please God, will one day return to assist in bringing to its highest possible development the relationship which has been the glory of our Company for nearly 28 years.

SULPHATE OF AMMONIA PRICES.

The Sulphate of Ammonia Association held a meeting at their Horseferry Road offices on June 26, to which all makers were invited, when the following resolution was unanimously passed, and has been communicated to the departments concerned:

"That this meeting of makers of sulphate of ammonia, although most willing to co-operate with the Government Departments concerned in stimulating food production, expresses its strong dissatisfaction with the prices fixed by the Government for home agricultural consumption during the season 1917-18, and considers these prices far too low, in view of the greatly increased and still increasing cost of manufacture in respect of acid, wages, lime, bags, &c., &c.

"The meeting strongly urges that, in place of the promise to 'consider,' in clause 8 of their circular letter dated June 9, 1917, the Food Production Department shall give a definite undertaking to indemnify makers of sulphate of ammonia in the event of a further rise in the price of acid being sanctioned by the Ministry of Munitions, and that in view of the increase of 10s. per ton in the price of acid which became operative on Jan. 1, 1917, full effect shall be given to clause 8 for the coming season.

"As regards munitions orders for shipment to neutral countries, the meeting desires to have an assurance that the Ministry of Munitions is prepared to act in a manner which will secure the highest possible price to British makers, and thus to the British Treasury.

"The meeting further requests most urgently that the Government Departments concerned shall ascertain the views of the makers' representatives regarding questions of price and other matters affecting the trade, before submitting proposals to the War Cabinet or other authorities, and that they shall take steps to secure that the Cabinet is fully informed of the feeling of the trade before decisions are taken."

MASSACHUSETTS BOARD OF GAS AND ELECTRIC LIGHT COMMISSIONERS.

The Thirty-Second Annual Report of the Commissioners for the year ended 1916 has been issued. It is a volume of considerable bulk, and deals with a large variety of subjects. Among them it is seen the Board are making

Recommendations for Legislation.

The Board state they have for many years regarded the existence of the power of a city or town to acquire a gas or electric plant, even though not exercised, an important aid to the effective public regulation of the privately owned companies under its supervision. Its value is necessarily dependent on the successful operation of such plants as have already been acquired by cities or towns. One weakness which experience has clearly developed is the insecure tenure of office of the managers of such plants, and the pressure which is frequently brought to bear upon them to permit or adopt practices with respect to the conduct of the business which will in time undermine the efficiency of such plants and the integrity of the public investments therein. The manager of the largest and most successful municipal plant in the Commonwealth was, in 1915, by Special Act, put under the civil service laws, to its distinct advantage. The Board believe that the managers of all municipal lighting plants should be brought under the civil service.

Any abandonment of public ownership once undertaken may also seriously impair the value of the existence of the power in cities and towns to engage in the business of supplying gas and electricity as an aid in the proper regulation of gas and electric companies. Considerable headway has recently been made in two important instances in projects for the sale to privately owned companies of existing municipal plants. In two minor instances such sales have occurred. The Statutes, while prescribing careful and deliberate action by cities and towns prior to acquiring municipal plants, are silent as to the steps necessary for their sale. While the question may properly be left to the ultimate determination of the cities or towns directly concerned, the Board recommend legislation prescribing the same careful and deliberate action in abandoning as in undertaking public ownership.

Cities and towns owning and operating municipal lighting plants have from the outset been required to make annual returns to the Board, and are subject to the specific authority of that body with respect to certain features of their business. They are not required,

however, to share in the Board's expenses, which have been assessed entirely upon the private companies under its supervision, although the Board have, in fact, since municipal lighting plants were first acquired, been frequently called upon for the interpretation of the Act and for advice and counsel as to accounts and the conduct of business, and still devote an increasing amount of time to them. In view of their number and importance, the Board believe that the time has come when their expenses should be assessed upon cities and towns which own municipal lighting plants as well as upon the privately owned companies.

These recommendations are embodied in the Act following:

An Act Relative to Municipal Management and the Commissioners' Expenses.

Section 1.—Section 113 of chapter 742 of the Acts of the year 1914 is hereby amended . . . . so that the section shall read as follows: The mayor of a city, or the selectmen or municipal light board (if any) of a town which acquires a gas or electric plant shall, subject to the rules of the Civil Service Commission, appoint a manager of municipal lighting who shall, under the direction and control of the mayor, selectmen, or municipal light board (if any), and subject to the provisions of this Act, have full charge of the operation and management of the plant, the manufacture and distribution of gas or electricity, the purchase of supplies, the employment of agents and servants, the method, time, price, quantity, and quality of the supply, the collection of bills, and the keeping of accounts. His compensation and term of office shall be fixed in cities by the city council or corresponding body, and in towns by the selectmen or municipal light board (if any); and, before entering upon the performance of his official duties, he shall give bond to the city or town for the faithful performance thereof in a sum and form, and with sureties to the satisfaction of the mayor, selectmen, or municipal light board (if any), and shall, at the end of each municipal year, render to them such detailed statement of his doings and of the business and financial matter in his charge as the Board of Gas and Electric Light Commissioners may prescribe. All moneys payable to, or received by, the city, town, manager, or municipal light board in connection with the operation of the plant, for the sale of gas or electricity or otherwise, shall be paid over to the city or town treasurer. All bills chargeable to the plant or to the appropriations therefor shall be paid by the treasurer on requisition by the manager or municipal light board (if any). The manager shall, at any time, when required by the mayor, selectmen, municipal light board (if any), or Board of Gas and Electric Light Commissioners, make a statement to such officers of his doings, business, receipts, disbursements, balances, and of the indebtedness of the city or town in his department.

Section 2.—A city or town which has acquired a municipal lighting plant shall not sell the same for the purpose of abandoning the distribution of gas or electricity to its inhabitants until such sale has been authorized in the manner and by the votes prescribed by sections 93 and 94 of chapter 742 of the Acts of the year 1914 for the acquisition of such plants.

Section 3 deletes from section 92 of the old Act the words "except for the operation of electric cars."

Section 4 amends section 136, which now reads as follows: All sums of money annually appropriated by the general court for the salaries and expenses of the Board, their clerks, and employees, shall be apportioned by the Tax Commissioner among the several gas and electric companies and cities and towns which have acquired municipal lighting plants; and, on or before the 1st day of July in each year, he shall assess upon each of the companies, cities, and towns its share of the sums, in proportion to gross earnings in case of companies, and to expense as defined in section 114 in case of cities and towns for the year last preceding the year in which the assessment is made; and such assessments, in case of companies, shall be collected in the same manner as taxes upon corporations are collected, and, in case of cities and towns, in the same manner as the State tax is collected.

Section 179 amends section 179 of the old Act, which now reads: Section 179—The amount of the expenses incurred by the Board in the inspection of gas and gas-meters, and in salaries paid therefor, less the amount deposited with the treasurer and receiver general from the fees for the inspection of meters, shall be borne by the several gas companies and cities and towns which have acquired municipal gas plants in proportion to gross earnings in case of companies, and to expense as defined in section 114 in case of cities and towns, and shall be assessed and recovered in the manner provided by section 136. If at any time, however, the amount collected under the provisions of sections 177 and 185 shall exceed the amount of such salaries and expenses, such excess shall be applied to reduce the annual assessment levied upon the several gas companies, under the provisions of said section 136 for the annual expenses of the Board.

New Issues of Stock or Bonds.

Later in the report, it is stated that 22 applications for approval of issues of stock or bonds have been decided during the year. The par value of the securities asked for was $6,806,500, and the par value of the amount approved was $6,281,275. In 14 cases the full amount asked for was approved.

Calorific Standard.

The report includes a statement by the Board as to the establishing of a calorific standard for gas, which has already been published in the "Journal" [see Oct. 3, 1916, p. 38.]

Contractors and Management of Gas Undertakings.

An order signed by the Chairman of the Board (Mr. Alonzo R. Weed) treats of the above subject. The principal parts were reproduced in our issue for Feb. 20 last (p. 340).

Statistical Information.

A large part of the report is taken up with statistical information. In the issue of the "Journal" for Dec. 12 last (p. 539) we gave some information relating to the progress of the gas industry in the State of Massachusetts.

Sliding-Scale.

Many pages of the report are occupied with a review of the conditions affecting the operation of the sliding-scale in connection with the Boston Gas Company.

At a recent meeting of the Directors of the Coatbridge Gas Company, Mr. George Braidwood, the Engineer and Manager, was granted an increase in his salary of £100 per annum.

THE ASHTON CHEMICAL WORKS EXPLOSION.

Statements which appeared in certain newspapers at the time of the explosion last month at a chemical works in the Ashton-under-Lyne district, inferring that the trouble was caused by the gasholders themselves exploding, have led to a considerable amount of correspondence in the local Press.

Mr. G. F. Handel Beard (of Messrs. R. & J. Dempster), replying to several of the letters, says that he visited the scene of the explosion 22 hours after it occurred, and the remains of the two Ashton gasholders proved conclusively that they did not explode. Had they exploded, the top and sides would have ripped outwards, and the guide-columns would have collapsed also outwards; whereas the top and sides collapsed inwards, and parts of the damaged columns were in the tanks underneath the damaged holders. Further, the few columns damaged (about seven out of 32) were those adjacent to the chemical works. Two men were close to the gasholders at the time; and if there had been an explosion in either holder, they would have been blown to pieces. The tanks suffered no damage. "My only object in writing," he says, "was to re-assure those people who have a fear of gasholders. As some (and probably most) readers are aware, it requires from four to seven parts of air to one part of gas to form an explosive mixture; and as one gasholder was full and the other half-full at the time, it was obviously impossible for the required amount of air to be drawn, or rather forced, in. As soon as the gas had all been burnt, the Engineer (Mr. Joseph Townsley) closed the valves to prevent any further gas being admitted."

Mr. H. S. Knight (gas engineer) states that he found portions of the chemical plant were blown right through the gasholders, thus evidently causing the gas to fire. The fractures in the holders had every appearance of being due to a "tearing" action applied outside. There may have been other explosions following the first one at the chemical works; but in his opinion these cannot be attributed to anything that occurred at the gas storage station. On examining the framework of the gasholders, he found that where it had fallen down it had fallen into the tank; whereas had the explosion taken place in the gasholders themselves, the framework would have fallen outwards. Personally, he thinks the "surrounding neighbourhood has a good deal to thank the gas manager for, owing to the manner in which he dealt with the unusual difficulty. Directly the holders had sunk into the tanks, the valves leading from the holders were closed, so preventing any mixture of gas and air accumulating, which would later on have caused an explosion."

MANCHESTER GAS IN THE STOCKPORT AREA.

War Time Request from the Ministry of Munitions.

At last Wednesday's meeting of the Stockport Town Council, Mr. Jacob Winter, J.P., the Chairman of the Gas Committee, in moving the minutes of the Committee, called attention to a letter received by the Town Clerk from the Ministry of Munitions with reference to the supply of gas to a firm in the area belonging to Stockport. This firm were erecting additional premises; and on the Manchester side there was a gas-main with which they would like to be connected in order to give them an additional supply if required, or if Stockport at any time were unable to cope with the demand. The Stockport Gas Committee had every confidence in being able to supply the demand, providing the department had the labour required; but upon the request of the Ministry of Munitions, the Gas Committee met specially the previous evening (Tuesday) and decided, subject to the Corporation not being in any way affected by the agreement, to allow the Manchester main to be connected-up.

Mr. M. M. M'Gregor said they ought to be very careful in making any such agreement. While they recognized the necessity for doing everything possible to help the Ministry of Munitions and the firm in question, there was the danger that it might be the beginning of a serious state of things. By the acquisition of this particular district (Heaton Chapel and part of Levenshulme), they had obtained the right to supply them with gas. It was probably true that, owing to the war, an abnormal amount of gas was being used; but if they came to an understanding with the Ministry of Munitions and the Manchester Corporation, they ought to safeguard themselves and lay down the principle that whatever gas might be supplied to the firm from the Manchester mains should go through, and be registered by, a meter and charged to the Stockport Corporation. The Stockport Corporation should foot the bill, and then it should be charged to the firm. This would afford them the protection they had the right to claim.

Mr. Winter, replying, said he intended to recommend this course to the Committee. He realized that they must be careful not to allow anybody to trespass on their ground. The whole matter would be dealt with very carefully by the Committee.

War Bonus at Manchester.—At a meeting of the Manchester Corporation Gas Committee, the Chairman (Mr. William Kay) reported that, in consequence of the rejection by the workmen of the terms for increased pay authorized by the Committee on June 8, he and the Deputy-Chairman had conferred with the Engineer and the Managers of the respective stations, and had interviewed representatives of the National Union of General Workers. As the result of the conferences, it was agreed that the existing war bonus, war wage, and good time-keeping bonus shall be merged into a war bonus of 10s. 6d. per week, in addition to ordinary rates of pay, to all adult able-bodied workmen employed by the Gas Committee; and to youths under 21 years of age, and to women, a war wage of 5s. 3d. per week shall be paid, in addition to their ordinary rates of pay. Such war wages are to be considered as being entirely due to the increased cost of living owing to the war. This does not apply to workmen whose wages are advanced in accordance with a trade arrangement, nor to members of the administrative, works, and distribution staff.

MOSSLEY GAS-WORKS REPORT.

Reporting to the Gas and Lighting Committee on the working of the Mossley Corporation gas undertaking for the year ended March 25, Mr. Joseph M'Nicholl (the Engineer and Manager) says the gross revenue for the year was £30,279, and the expenditure £23,688, leaving a gross profit of £6591. Deducting interest and sinking fund charges, there is a net loss on the twelve months' working of £725. Though 1200 tons less coal was used than in the preceding year, the cost was practically the same; the average price per ton being 1s. 7d. higher. The quantity of gas sent out from the works showed a decrease of 6·46 p.ct. This reduction in consumption was the result of the lighting and early closing restrictions and the operations of the Summer Time Act. The coke produced was 570 tons less, yet its sale realized over £500 more; the average increase per ton being 3s. 11d. With about 70 tons of tar less, the amount realized was £30 more. Ammoniacal liquor realized £270 less; about half of this sum being accounted for by the reduced make, which was 200 tons down, and the other half by the reduction in price. The cause of the latter reduction was the increased cost of labour and materials for the manufacture of sulphate of ammonia, and the reduction in the price realized for the latter brought about by the action of the Board of Agriculture, which resulted in the suspension of licences for export. The whole of the production since January has been absorbed by the home markets; and the price fixed for home sales was at least £3 per ton less than could have been obtained for export. The amount paid for income-tax increased from £246 for the year ended March 25, 1914, to £2286 for the year just concluded.

The gross revenue of the undertaking from all sources amounted to £30,280, and the charge on this capital for taxes and rates to £10,426 —*i.e.*, more than one-third of the total revenue. These amounts, if divided by the quantity of gas sold, work out at 4s. 5¼d. and 1s. 6d. per 1000 c.ft. respectively. The amount paid to the wives and dependants of the workmen of the department serving with the Colours, was £319.

The total amount of gas sold through prepayment meters was 29,341,100 c.ft.; and the corresponding amount for the previous year was 31,618,000 c.ft. The quantity of gas made was 159,559,200 c.ft., or 11,527 c.ft. per ton of coal carbonized, in comparison with 11,389 c.ft. the previous year. The unaccounted-for gas amounted to 13·04 p.ct., against 7·79 p.ct.

VERTICALS V. HORIZONTALS AT KENDAL.

The Kendal Corporation gas accounts for the year ended March 31 last show a surplus of £578. The gross profit was £4422.

The report gives the subjoined comparison of results with Woodall-Duckham vertical retorts *v.* hand-charged horizontals—93,026,500 c.ft. annual make of gas.

Horizontal Retorts.

	£ s. d.	£ s. d.	£ s. d.
8228 tons coal carbonized at 24s. 5d.		10,045 0 0	
Less residual sales:			
Coke, 3702 tons	3,587 0 0		
Tar, 89,108 gallons	531 0 0		
Sulphate, 82 tons	856 0 0		
		4,974 0 0	
		£5,071 0 0	
Carbonizing wages, 8228 tons at 2s. 10d. (1914-15 rate)		1,166 0 0	
			6,237 0 0

Vertical Retorts.

7299 tons coal carbonized at 24s. 5d.		£8,908 0 0	
Less residual sales:			
Coke, 3769 tons	3,652 0 0		
Tar, 89,848 gallons	535 0 0		
Sulphate, 87 tons 8 cwt.	916 0 0		
		5,103 0 0	
		£3,805 0 0	
Carbonizing wages, 7299 tons at 1s. 10·5d.		687 0 0	
			4,492 0 0
Gross saving			£1,745 0 0
Interest and redemption on capital outlay			691 0 0
Net saving			£1,054 0 0

ECONOMY IN COAL CONSUMPTION.

The subjoined statement on the subject of economy in coal consumption has been issued by Mr. Arthur Wright, who intimates that the Coal Controller has authorized him to circulate it.

The Controller of Coal Mines has been advised that an economy in the use of coal can be effected, and much inconvenience avoided during the next and succeeding winter, by the giving effect as far as possible to the following suggestions:

(1) POWER USES.—That the various factory owners throughout the country who at present generate their own power by means of coal should make arrangements for taking their power requirements from an outside source, in districts where the power supplies have a margin available, and thereby reduce the total amount of coal used. The Coal Controller will assist as far as possible in obtaining priority for plant, machinery, and motors required, provided a substantial coal saving can be demonstrated.

(2) USE OF COKE.—The use of locally produced coke or coke breeze in place of coal as much as possible in domestic grates, factory furnaces (where such cannot take an outside supply), and public utility plants at light loads, also in baths and washhouses, provided coke is available in sufficient quantities.

(3) PUBLIC SERVICES.—The curtailment of those public services which entail coal consumption, such as early and late tramway running—after consultation with the Ministry of Munitions where munitions workers are likely to be affected—and the prevention of unnecessary use of water.

(4) STOCKS.—The accumulation of stocks in the summer months, as far as deliveries will permit, of the coal required during the winter months, the cost of such storage being considered as a form of insurance against the probable coal shortage.

(5) COOKING AND HEATING.—The installation of gas or electric cooking and heating appliances in public and private buildings, with a view of saving coal generally, and lessening the serious inconvenience to the public next winter should the local distribution of coal become irregular or insufficient.

(6) EMERGENCY DISCONNECTION.—The application to the Board of Trade by the electric supply authority for sanction under Regulation B1, to disconnect classes of non-essential consumers in cases of urgent necessity, in order to enable the supply to be continued to munition and other essential users. This power should be obtained, although it need not be put into execution until the necessity arises.

(7) INTERCONNECTION.—Making arrangements as suggested in the letter of the Board of Trade, dated May 25, 1916, with the neighbouring towns to interconnect electric distribution systems or generating plants by means of underground cables, or in suitable cases of temporary overhead wires over the intervening country, so as to enable one or two of the most economical power stations in each district to supply several towns at light loads, instead of each town having to run its own power station uneconomically at such times. This would also enable the various power plants to shut-down in turn during week-ends and holidays, to effect plant repairs, and would provide some amount of power at call as a stand-by in case of coal supplies giving-out locally.

In order to carry out the last suggestion, the Controller is advised that additional powers will have, in some cases, to be obtained, both as regards passing over private property, trading between public utility companies and local authorities, and possibly relief from some of the existing power supply regulations; and if cases are brought to his notice, they will receive his assistance where the saving in coal would warrant the provision of the necessary plant, mains, &c.

ADULTERATION OF COAL GAS.

Suggested Agreements with Manufacturers.

The subject of inert constituents in coal gas is one to which considerable attention has been directed editorially in the "JOURNAL" for some time past, with a knowledge of the subcurrent of events in this particular, and of the menace at the very doors of the industry. In the "Engineering Notes" of the "Daily Telegraph" on Wednesday last, reference was made to coal and town gas "adulteration." Regarding gas, the writer said:

As coal gas can be made, and is being supplied even at the present time by some companies, with not more than about 10 p.ct. of inert gases, it ought to be possible, making due allowance for the difficulties under which the gas companies are working, for these inert gases not to exceed about 15 p.ct. In many instances this figure is exceeded, and even 30 p.ct. and more waste products has been found to be present. To allow gas of such poor quality to be passed into the mains is neither fair to the consumer nor in the best interests of the gas undertakings themselves; and all users of coal gas for factory operations would find it to their advantage to make regular tests of the calorific value and analyses of the gas supplied to them. Large consumers, particularly before installing gas-melting plant, would be well advised to have an understanding with the gas company concerned as to the maximum percentage of inert gas permissible in the gas supplied, especially where high temperatures are required, as it is obvious that the highest temperatures cannot be obtained with gas containing an excessive percentage of incombustible constituents. It is obvious, too, that similar precautions are desirable in the case of power installations driven by gas-engines, the output of which must be affected if an undue quantity of inert gases—nitrogen and carbon dioxide—is fed into the engine as a substitute for the proper gaseous mixture.

GAS CONSUMPTION FOR VARIOUS PURPOSES.

In a recent number of "Het Gas," Heer Dr. Stavorinus, of the Amsterdam Gas-Works, had an article in which he discusses the dividing-up of the gas consumption in a house for various purposes. The subject arose out of the Government enforced economy; his object being to ascertain how this economy could best be secured without seriously affecting the domestic routine.

In the Technical Press, he says, there are but few communications to be found dealing with this matter. This is understandable, because the ascertaining of the exact amount of gas consumed for different purposes—such as cooking, heating, illuminating, and water heating—requires separate gas services, and as many meters. No private householder or tenant will go to the trouble or incur the expense of having his dwelling piped in a manifold manner. Only one case is to be found where the director of a German gas appliance manufacturing firm piped his house in this manner, so that he was able to gauge the consumption. On the other hand, there are available many results secured by the lady demonstrator of the Amsterdam Gas-Works, with meals prepared during cookery lectures; and from these it is possible to make some calculations concerning the gas consumption for a middle-class dinner in war time.

In these lectures, there have been cooked dinners for five or six persons in the same manner as may be done in any kitchen in ordinary practice. For a dinner consisting of soup, meat, vegetables, and sweets, the gas consumption ranges between 720 and 519 litres; the average being 652 litres (23 c.ft.). This makes in a year 8472 c. ft. of gas for the preparation of dinner, or 1694 c. ft. per head—not including, of course, the gas consumed for heating water or for the preparation of breakfast, luncheon, &c. Is it possible to secure some saving on these figures? The use of hay-boxes, and even newspapers, for packing

cooking vessels may, where necessary, considerably assist in restricting the use of gas.

The results of investigations show clearly that the heating of water for scullery purposes is the weak spot in the kitchen. Taking a boiling-ring of normal efficiency, and a copper of good construction, the gas consumed in the heating of water solely for kitchen and scullery purposes may amount to 58 p. ct. of the total consumed in the kitchen. The replacement of the ring and the boiler by a small water-heater or geyser effects a saving on this of 20 p. ct., owing to the higher efficiency of these appliances. It is therefore in the interest of gas suppliers and consumers to have water heating carried out exclusively by these geysers.

Now the question may be considered of how much gas is consumed for the lighting of a house. Taking an eight-roomed house, in which seven apartments are fitted with gas-lights—three sleeping rooms, each with one burner of normal capacity, and four living rooms, having together fourteen burners—the total consumption may be taken at 23,121 c. ft. a year, or 3318 c. ft. for each room. The point is as to whether these figures can be reduced to meet war conditions. It seems that seventeen burners for seven rooms are ten burners too many. Allowing for each room one burner in normal use, we arrive at an average of 10 burning hours daily, or a total of 3650 hours per annum. Assuming the burners are of normal efficiency, a total consumption may be reckoned of 12,884 c. ft. On the first figure mentioned, this means an economy of 10,237 c. ft., or 44 p. ct. on lighting only.

As to gas-fires, for the heating period there are taken 32 weeks, or 224 days. For a seven-roomed house, the gas consumption for heating has been found to amount to 41,548 c.ft. On the dimensions of the rooms, this comes to an annual gas consumption of 117 6 c.ft. for each cubic metre of air-space in the room. This figure is, however, naturally liable to many variations; so that one finds figures mentioned ranging between 3·27 and 3·95 c.ft. for consumers of normal constitution, and 5·92 c.ft. for those of more advanced age. All these figures represent consumption per annum per cubic foot of air-space. Other figures are 5·2 and 6·2 c.ft. for schools, and 5·2 c.ft. for factories. In dwelling-houses, the normal consumption may be regarded as being between 4 and 5 c.ft. per annum; but these figures are averages for the whole house. For sleeping rooms, one may accept 1·5 c.ft., and for living rooms 8 c.ft., as average figures. From these somewhat divergent figures, it may be concluded that there is ample room for war economy when the necessity exists.

To sum up, in an all-gas house the consumption may be taken as follows: Lighting, 22 p.ct. of the total consumption; room-heating, 43·4 p.ct; bath-heating, 5·5 p.ct.; cooking, 19·8 p.ct.; ironing, 1·3 p.ct.; water-heating, 8 p.ct. (with special water heater).

Price of Gas at South Shields.—The South Shields Corporation have received a letter from the Gas Company stating that the price of gas will be increased 6d. per 1000 c.ft., as from the June quarter.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

For the benefit of readers who may be wondering at the absence from the last two issues of the "Journal" of the customary report on "Sulphate of Ammonia in the Provinces," it may be stated that the reason this is being omitted is because there is really nothing to comment upon in the abnormal situation that has been brought about in this trade. Prices for home agricultural purposes have been fixed by the Government for some considerable time past; and the export business has now to be done on lines laid down by the Food Production Department. Orders for shipment abroad can only be taken with the consent of the Distribution Committee, and all business has to be done through the Association; the profits being pooled between members of a group called the Sulphate of Ammonia Export Traders. In these circumstances, there are no fluctuations in values as in ordinary times; and consequently there is really no market to report upon.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 9.

The London tar products market is without alteration in prices. There are buyers of pitch inquiring for supplies for next season; and it is thought that about 40s. net per ton f.o.b. makers' works could be obtained.

Sulphate of ammonia is in demand for the home trade on the basis of the official figures; the manure mixers being anxious to secure supplies.

Tar Products in the Provinces.

July 9.

There is no alteration in the market for tar products. The prices quoted for pitch are quite nominal.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

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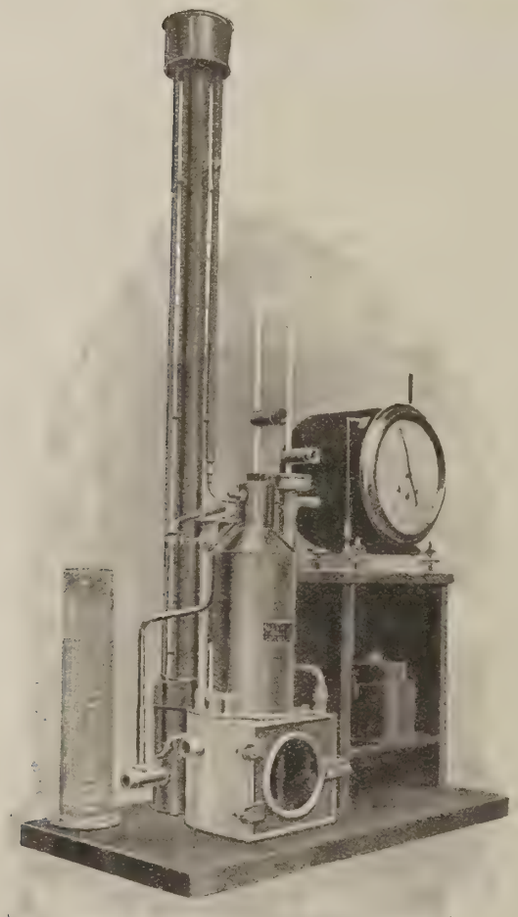

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COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is active, and work at the collieries has been generally brisk; the demand for government needs and for the "controlled" factories being heavy. Best Northumbrian steam coals are steady at 30s. per ton f.o.b., second-class qualities are from 25s.; and steam smalls are steady at from 18s. 6d. to 19s. 6d. There is a fair inquiry for forward supply, and production is well taken up on the whole, though much of it is sold at old-contract prices. In the Durham coal trade there is a full inquiry, and the home consumption seems to be increasing. Gas coals are steady for best kinds; the quotations being: "Wear specials," from 29s. to 31s. per ton f.o.b.; best Durham gas, about 25s.; and second-class gas from about 23s. 6d. Freights are steady; the rate on gas coal being about 15s., Tyne to London. Contracts are believed to be closing more readily now; but the exact price does not publicly transpire, though the 4s. regulation makes changes from the last contracts very slight. There is now a very full demand for coking coal; and this has a steadying effect upon most kinds of Durham fuel. Good gas coke is selling freely generally; the price being from 31s. to 32s. 6d. per ton f.o.b., according to class. Tonnage is in need for coke; the rates to the northern ports of France being from 45s. to 46s.

Glasgow Coal and Gas Prices.—The Glasgow Corporation have purchased for the gas-works a total of 820,000 tons of coal for the requirements of the current year. The average price is about 18s. per ton delivered at the works, which is rather less than the price paid last year. Owing to increased wages and cost of materials, the price of gas to the ordinary consumers will be 2d. higher than last year, or 2s. 8d. per 1000 c.ft.

Coal Controller and Gas-Works' Requirements.—In the minutes of the Stockport Gas Committee, it was stated that the Gas Engineer (Mr. S. Meunier) recently had an interview at the office of the Controller of Coal Mines with reference to the delays on certain coal contracts, and the difficulty of renewing others. In consequence of the interview, he recommended the Gas Committee to advertise at once for the coal required. Mr. Meunier reported that the Controller's Department had promised to deal direct with the collieries in regard to the matters he had raised.

Death from Gas Poisoning.—Robert Quinlan, audit clerk in the War Office at York, was found dead in bed, with the room strongly smelling of gas, which was escaping from the burner of an incandescent light. His wife was away, but had been recalled owing to her husband having failed to attend at the office for a week past; and she came home to find him dead. Nothing was wrong in connection with deceased's work; but a neighbour said he had complained of being ill. The Coroner's Jury decided that there was not sufficient evidence to show how the gas had been left on.

Gas Profit Reduction at Loughborough.

In moving the adoption of the Gas Committee's minutes at the monthly meeting of the Loughborough Town Council, Mr. W. F. Charles, referring to the balance-sheet, said that there had been an increase in the capital account, mainly due to the extension of mains to manufacturing premises. Unfortunately, the balance-sheet was not a good one, or rather it was a good one in the circumstances; but the circumstances were bad. The cost of manufacturing showed an increase of £684, mainly due to extra cost of coal, cartage, fodder, and the purchase of two horses. The second item had decreased £317, or 53 p.ct., due to improvements in purifying, &c. Most of the other items showed slight increases, due chiefly to the extra cost of material and wages. On the general item of wages there was a slight decrease, due probably to the less quantity of gas made. On the other side, there had been a decrease in the quantity of gas sold of 7,853,000 c.ft. They were down in turnover in cash sales by £862 on gas alone; but they had a good increase in the sale of residuals of £961, mainly due to the increased price of coke. They were a little down on the sales of tar and ammonia. The slot meters, owing to the increase in the general price, were really losing for the Committee to the extent of 2d. per 1000 c.ft. The total profit for the year was £6509, against £6978, showing a shrinkage of £469. Interest and sinking fund came to £6483, against £6144—an increase of £329. The difference between the gross profits this year and the interest and sinking fund left a balance of only £25, as against £834 last year, excluding income-tax. The income-tax this year was £1753; and taking this from the £25 balance net profit, it left them with a balance in the profit and loss account of £1728, against £3544 last year. Another bad year such as they had had would wipe out their accumulated profit. They looked for an increased production of gas per ton of coal; but the main hope lay in a general increased consumption.

Worthing and the Calorific Power Order.—The Board of Trade have made the Order, under the Gas (Standard of Calorific Power) Act, asked for by the Worthing Gas Light and Coke Company. The Town Council have lodged a protest against the new standard remaining in operation for five years; and urge that, at the expiration of five years or such other shorter period as may be fixed by the Order, the question of increasing the standard calorific power or the pressure shall be automatically considered by the Board "whether application in that behalf be made to the Board or not."

Glasgow and the Calorific Standard.—The Town Clerk reported at a meeting of the Glasgow Corporation Gas Committee that the application which had been made to the Secretary for Scotland on behalf of the Corporation, for an Order under the Gas (Standard of Calorific Power) Act, 1916, to substitute for the standard of illuminating power of the gas supplied by the Corporation, a standard of calorific power of 500 B.Th.U., and for the testing of the gas, had been granted. The Committee, after hearing the General Manager (Mr. Alex. Wilson), instructed him to purchase the necessary testing apparatus.

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The Gas Engineership of Blackburn.

At Thursday's meeting of the Blackburn Town Council, Mr. Bates asked for information as to the standard of qualification on which the appointment of Mr. J. W. M'Lusky as Gas Engineer had been made [see p. 59]. The Mayor (Alderman Nuttall, who is also Chairman of the Gas Committee) said that the Special Sub-Committee, representing all sections of the Council, were appointed to find suitable men. They visited a good many places, and were unanimous in their recommendation; and this recommendation met with the unanimous approval of the Gas Committee. The question of his age was considered; but it was felt that they ought not to allow sentiment to stand in the way of their choice. Mr. M'Lusky's appointment would not affect his position in regard to the army. Mr. E. Porter, the Local Secretary of the National Union of Gas-Workers, moved to refer back the Committee's recommendation, as a protest against the method in which it had been brought about. He complained that the Gas Committee had not been taken into the confidence of the Sub-Committee as to the names and qualifications of the applicants, in order that they (the Committee) might come to an intelligent decision. The Labour party were as much entitled to know the names of applicants for this position as were other members; and to give effect to their protest, he moved to refer the report back. Mr. Bates, who seconded, said that Alderman Nuttall's reply was not an answer to his question. Mr. Gregson thought it unfortunate that the matter of this appointment had not been fully discussed in the General Purposes Committee, as much of what had been said that day might thus in this way have been avoided. Only three votes were recorded against the Gas Committee's recommendation.

Dundee Gas Accounts.—At the annual meeting of the Dundee Gas Commissioners, the Auditor pointed out that no depreciation was made on meters, stoves, or gas-fires, and no contributions had been made to contingent or reserve funds. The Convener pointed out they had written-off over £18,177 during the year, and were really in a healthy position. Nothing was added to capital; everything being paid out of revenue. Against temporary loans is a total of £72,000 of outstanding accounts and stocks on hand. The Auditor pointed out that the value of the Broughty Ferry station taken over by the Dundee Gas Commissioners should be written-down, as the plant was not now in use. The Lochee gasholder was dismantled and out of use, and the value should be written-off. The temporary loans aggregated £59,140. Mr. Crichton said the Broughty Ferry works stood in the books at £38,000; but he questioned if they were worth more than half this. Bailie Kinmond stated that the Engineer valued the materials at the Broughty Ferry works at £10,000; but prices had gone up, and he thought that the materials should be disposed of. The Treasurer said as regards capital debt, by the application of the sinking fund in 20 years there would be no capital debt on the gas-works.

Birkenhead's Claim to a Record Yield.

At the last meeting of the Birkenhead Town Council, the Chairman of the Gas Committee (Alderman M'Gaul) stated that, in spite of the high price of coal, oil, stores, and wages, the financial statement of the undertaking for the past year was very satisfactory. The profit was not quite so large as in pre-war years, but the gross amounted to £49,606, as compared with £46,216 last year. The interest and sinking fund was very heavy, amounting to £35,264. The Committee had spent £1000 out of revenue; and after deducting these charges they had taken £3384 from the fund termed the "reduction of price account." This gave the Committee an amount to be divided of £17,356, which had been allocated as follows; In aid of the rates, £5678; reduction of price account, £5678; renewals, £5000; special reserve, £1000. During the past year they had spent out of renewals and special fund £2234. The balance standing to the credit of the various reserves was £65,639. Last year there was made 1,011,000,000 c.ft. of gas, using 67,650 tons of coal. No water gas was manufactured for five months, and there was a conservation of oil and coke which stood the undertaking in good stead; there being a stock of something like 12,000 tons of coke in hand. In one respect a record was attained. They obtained from one ton of coal 12,466 c.ft. of gas. This was a record for any works of Birkenhead's description using the same type of coal. Thanks were due to the Engineer, to the staff, and to the whole of the employees for the excellent results obtained now that their new machinery was in proper working order. The undertaking now had 120 coal-wagons, which greatly assisted them in getting in stock for the winter. The show-room had done very well during the past year. There had been an output there of articles sold of 7288; being a considerable increase on the year before. The large number of cookers now in use had been the salvation of the concern so far as profits were concerned during the past year. The consumption in the day-time had been considerably more than it was at night, thanks to the fact that 24,655 cookers were in use.

Kirkcaldy Gas-Works Deficit.—The Kirkcaldy Burgh accounts show a deficit on the gas undertaking for the year of £489 The Town Council have increased the price of gas from 4s. 9d. to 4s. 11d. per 1000 c.ft.

Increase in Price at Ossett.—The Ossett Corporation have notified consumers that the price of gas will be advanced 3d. per 1000 c.ft. after the meters have been read at the end of the June quarter. The increased charge will be 3s. 3d.

Oldham Gas Department Salaries.—At the last meeting of the Oldham Town Council the following recommendations respecting salaries were approved: Mr. Tim. Duxbury (Gas Engineer), from £500 to £600 per annum; Mr. Isaac H. Massey (Distribution Superintendent), £312 per annum; Mr. Ernest Parry (Commercial Superintendent), from £250 to £312 (in twelve months).

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Burton Gas Department and National Baby Week.

The Burton-upon-Trent Gas Department have, we learn from the Manager (Mr. R. S. Ramsden), been able to help the "Baby Week" movement by a general distribution of the British Commercial Gas Association pamphlet "Safeguarding the Babies," extracts from which were given in the news columns of both local papers. By arrangement with the Secretary of the B.C.G.A., two different "Baby Week" advertisements appeared in the local Press, each being repeated at a few days' interval. There was a recommendation as to every house having a gas-stove in a "Daily Telegraph" editorial on July 3; and this was quoted in the "Burton Gazette" the next evening. Advantage was taken of the suggestions in the B.C.G.A. leaflet to arrange three of the show-room windows as nurseries and bath-room, with a good display of suitable appliances; and attention was called to this at the foot of the local Committee's programme. The local Committee borrowed, and made use of, several domestic gas appliances for their Child Welfare Exhibition in one of the public halls; and altogether the uses of gas in connection with children's welfare have been brought very prominently before the public. The Gas Department are co-operating with the local Committee responsible, by letting them have the gas show-rooms for a demonstration on fruit bottling, by Mr. Stoney, Instructor in Horticulture to the Staffordshire County Council.

Oldbury Gas Manager's Salary Increased.

At a meeting of the Oldbury District Council on Friday, the Gas Committee recommended that the salary of the Gas Engineer and Manager (Mr. C. H. Carder) be increased by £100 per annum as from July 1. The Chairman of the Gas Committee (Councillor E. W. Jackson), in moving the adoption of the recommendation, pointed out that it was the salary which Mr. Carder's predecessor received; but at that time the quantity of gas made (140 million c.ft.) included 7½ millions supplied to Rowley and about 12 millions for public lighting. Last year the total make was 160 million c.ft., and included neither of these two items. Mr. Carder was appointed in Sept., 1914, when things had got behind badly, both in the state of the works and the finances, owing to the long and serious illness of the late Manager. There was then an overdraft of £10,800, whichi ncluded £6200 for the new gasholder. Mr. Carder re-organized the whole system of administration at the works, installed a water-gas plant, the cost of which (£3000) was paid out of revenue, and provided a new and larger exhauster. He had also put a roof over the purifier, and was now finishing a benzol plant. He had carried on very difficult negotiations with the Surveyor of Income-Tax, going back over a period of years, and settled the matter in a very satisfactory manner. The general overdraft of £4600 had been paid off, and £500 placed aside for the new holder; while the works had been put into a proper state of repair. Mr. Carder had turned out to be a thoroughly good man, and all the members of the Gas Committee were quite satisfied with what he had done. Some opposition was offered by one or two members; but they based it on the grounds of the high cost of gas, and because they considered £400 a year was too much to pay for the position. Mr. Jackson pointed out that the increased charges for gas, when set against the increased expenditure, had only brought them a net profit of £120. The recommendation of the Committee was adopted with four dissentients.

The Leslie Gas Light Company (Fife) have raised the price of gas from 5s. to 5s 7½d. per 1000 c.ft., owing to the large increase in expenditure. A dividend of 5 p.ct. is being paid for the past year.

The Bermondsey Borough Council have added a further increase of 20 p.ct. to their pre-war charges for power and 10 p.ct. on electric lighting—making a total increase of 50 p.ct. on the former and 40 p.ct. on lighting.

The Heckmondwike District Council, having considered the Heckmondwike and Liversedge Gas Company's application to the Board of Trade for an Order to substitute a calorific for the illuminating power standard, resolved to offer no opposition.

It is stated that plant is about to be erected at Manchester for the manufacture of nitrogenous products by means of an electrical process of British origin, the rights for which are owned by the International Nitrogen and Power Company. The installation is expected to be at work within six months.

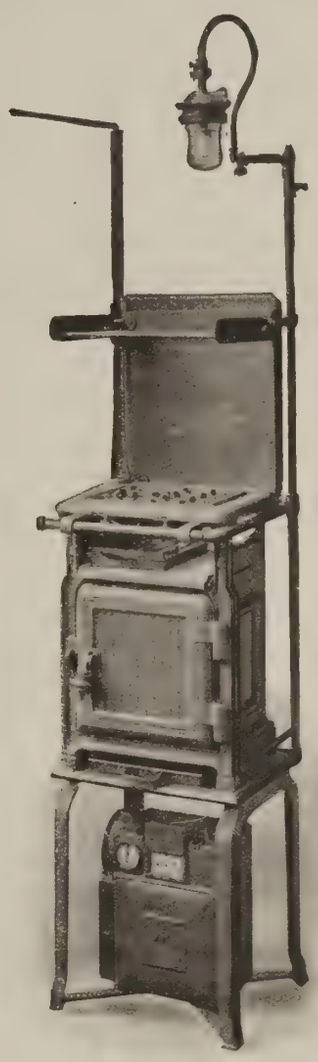
Messrs. Curtis's and Harvey, Ltd., have engaged the services of Mr. Robert W. Buckingham as a representative in connection with their incandescent gas-mantles. At the outbreak of the war, Mr. Buckingham was Sales Manager of the British Graetzin Company, which position he immediately resigned. Previous to that time he was the representative of the New Inverted Gas-Lamp Company.

Messrs. George Waller & Son, of Stroud, Glos., announce that (for family reasons) they, on the 2nd inst., registered the business as a Private Limited Company, and from the present time the style of the firm will be George Waller & Son, Ltd. The general management and conduct of the business will be the same as for many years past. For purposes of registration the capital of the concern has been fixed at £30,000 in £1 shares.

Mr. W. A. Schultz, of No. 50, Cannon Street, E.C., intimates that, feeling that all loyal subjects who, in common with himself, are British born and have devoted their lives to the service of the State, but who have hitherto borne names of German origin, have no other course open to them than to follow the example set by His Majesty, he has abandoned the name of Schultz, and adopted that of Scott. The style of his firm will therefore be "W. A. Scott and Co."

There is a remarkable popular impression in Shipley, according to local gossip, that there has been an increase of from 30 to 100 p.ct. in the gas the householders are supposed to have used during the past half year, according to the latest meter registrations, as compared with the corresponding period of the previous year; and yet everybody denies having used any more gas than usual for either lighting or cooking. A suggestion has been made in the town that a meeting of consumers should be held, with a view to appointing a deputation to seek an interview with the Gas Committee.

Slot Installations



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In the City Art Gallery, Leeds, an exhibition was opened yesterday, and will remain open until the 21st inst., of official photographs and samples of work upon which women are employed in engineering and other industries on munitions of war. It is organized by the Labour Supply Department of the Ministry of Munitions.

A Company has been registered, as "Successors to the Otto Coke-Oven Company, Ltd.," with a capital of £100,000 in £1 shares, to acquire part of the undertaking of the Otto Coke-Oven Company, Ltd., by licence of the Board of Trade, under the Trading with the Enemy Act.

STOCK MARKET REPORT.

THE Stock Exchange reopened on Tuesday in a cheerful mood and fully prepared to have a good time. It was the news from Russia that threw this bright ray upon the House. Perhaps the greater weight of public opinion had for some time past been optimistically tending and inclined to believe that the unrest wrought by extremists would gradually settle down. But probably no one was prepared for the kaleidoscopic change in the situation. That the Russian army should arise, take the field, and achieve a notable success, was almost beyond the bounds of possibility. The influence of this news was far-reaching, and markets in general took heart with increasing confidence day by day. The only "fly in the ointment" was the old complaint that business was still too quiet. This was to some extent a product of the favourable turn; for, in anticipation of a smart rise, sellers were not eager to accommodate would-be buyers.

The gilt-edged market was again conspicuously firm. Home Government issues were in the van, particularly Consols, which improved almost daily. Indian issues also showed advance. Home Rails had a marked recovery, enjoying a demand long estranged from them. Americans closed rather dull, and Argentines after a good start fell back towards the close.

In the Foreign Market, Russians were naturally in full favour, and French, Japanese, and Scandinavian were firm. Chinese internal affairs caused a set-back. Among the rest, South Africans were firm, Rubber was rather unsettled, and Oils, Breweries, and Textiles did well.

Business in the Gas Market showed a rather better tendency; the aggregate of transactions (after making allowance for a short week of only four days) being rather higher than has recently ruled as the average. Changes in quotation were not numerous, and were only slight in degree; but they moved both ways. Gas Light ordinary, Liverpool, British debenture, and River Plate advanced, while South Metropolitan, Imperial Continental, and European receded.

In the Money Market rates became firmer, and discount stiffened in view of Treasury Bill rates being raised from 4½ to 4¾ p.ct.

Bargains done for cash during the week were as follows: On Tuesday, Brentford "B" 79, Cape Town 2¼, Commercial 4 p.ct. 72⅛, ditto 3½ p.ct. 66½, ditto debenture 51½, Gas Light ordinary 71½, 71¾, 72, 72⅛, Imperial Continental 80½, 81, 81⅛, San Paulo 8, South Metropolitan 74½, Southgate 10 p.ct. 142½, 143¾, ditto 7 p.ct. 101¼, 101⅞, ditto preference 76¼, 76⅞. On Wednesday, Bombay 4$\frac{31}{32}$, Commercial debenture 52, Gas Light ordinary 71, 71⅛, 72, 72¼, ditto preference 73, 73½, ditto debenture 55⅝, 56⅛, Ilford debenture 66, 66½, Imperial Continental 80¼, Oriental 105, Primitiva 37s. 6d., ditto preference 55s., South Metropolitan 74, Tottenham "B" 69½, 70. On Thursday, Commercial 3½ p.ct. 66½, Gas Light ordinary 71½, 71⅝, 71¾, 72¼, ditto preference 73¼, 73½, Imperial Continental 80, 80⅛, Newcastle 70¾, Oriental 105½, South Metropolitan 74½, 74⅝. On Friday, Alliance and Dublin debenture 62, Bournemouth "B" 10$\frac{31}{32}$, 11$\frac{1}{32}$, Gas Light ordinary 71⅛, 72, 72¼, ditto debenture 56¾, Imperial Continental 80½, Primitiva preference 60s., ditto debenture 78½, South Metropolitan 74, 74½, Barnet "C" 135, ditto "D" 100.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex Dividend.	Previous Div on Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	62
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4$\frac{31}{32}$—5$\frac{1}{32}$	4$\frac{31}{32}$
50,000	10	Feb. 26	16	15/-		29—30	24—26	..
383,110	10	,,	7	7/-	Bournemouth Gas (10 p.c.)	15—15½	10$\frac{3}{4}$—11½	10$\frac{31}{32}$—11$\frac{1}{32}$
115,000	10	,,	6	6/-	Bournemouth Gas (B 7 p.c.)	13½—14	9¼—9⅜	..
159,740	—	—	—	4%	Bournemouth and Water (Pref. 6 p.c.)	..	69—71*	..
992,045	Stk.	Feb. 26	14	55/-	Bournemouth and Water (4 p.c. Deb.)	..	..	..
734,920	,,	,,	11	53/9	Brentford A Consolid.	261—266	81—84	..
55,000	,,	,,	5	5%	Do. B New	204—209	79—82	79
221,400	,,	June 11	4	4%	Do. 5 p.c. Pref.	109—111	83—88	..
217,380	,,	Feb. 26	11	10%	Do. 4 p.c. Deb.	91—93	65—67	..
244,200	,,	,,	8	7%	Brighton & Hove Orig.	208—213	150—155	..
530,000	20	Mar. 26	12½	22/6	Do. A Ord. Stk.	154—159	102—107	..
120,000	Stk.	June 26	4	4%	British	44—45	33—34	..
245,771	,,	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68*	..
100,000	10	—	—	—	Buenos Aires 4 p.c. Deb.	85—87	53—56*	..
100,000	10	—	—	4½%	Cape Town & Dis., Ltd.	1½—2½	2¼—2$\frac{3}{4}$	2¼
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Pref.	4—6	6—7	..
157,150	,,	Feb. 26	5	5%	Do. 4½ p.c. Deb. Stk.	70—75	60—65*	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Chester 5 p.c. Ord.	108—110	79½—80½	..
560 000	,,	,,	5⅛	46/8	Commercial 4 p.c. Stk.	106—108	72—74	72½
475,000	,,	June 11	3	3%	Do. 3½ p.c. do.	103—105	66—68	66½
800,000	,,	,,	4	—	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	51 —52
200,000	,,	,,	7	—	Continental Union Ltd.	76—79	39 -41	..
278,400	,,	,,	—	11½%	Do. 7 p.c. Pref.	115—118	60—62	..
	—	—	—	10%	Croydon B and C 7 p.c.	..	170—180	..
492,270	Stk.	—	6	5½%	Do. E	..	..	..
55,000	,,	—	4	4%	Derby Con. Stk.	123—125	95—100	..
1,002,180	10	July 29	10	7/6	Do. Deb. Stk.	102—104	80—83	..
16,313 430	Stk	Feb. 10	4/17/4	42/-	European, Ltd.	17½—18	11—12	..
2,600,000	,,	,,	3½	3½%	Gas Light and Coke (4 p.c. Ord.)	98—102	71—73	71—72½
4,062,235	,,	,,	4	4%	Gas Light and Coke (3½ p.c. max.)	76—79	56—58	..
4,674 850	,,	June 11	3	3%	Gas Light and Coke (4 p.c. Con. Pref.)	96—99	72—74	73—73½
130,000	,,	,,	10	10%	Gas Light and Coke (3 p.c. Con. Deb.)	72½—74½	55—57	55$\frac{1}{16}$—56¾
258,740	,,	Mar. 12	5	4½%	Gas Light and Coke (10 p.c. Bonds)	..	..	..
70,000	10	April 29	11	6%	Hastings & St. L. 3½ p.c.	87—89	50—57	..
86,600	—	—	—	9½%	Hongkong & China, Ltd.	16½—16⅝	7½—8⅛	..
131,000	Stk.	Mar. 12	7⅞	7⅛%	Hornsey 7 p.c.	..	120—130	..
65,780	,,	,,	6⅜	5⅞%	Ilford A and C.	151—154	102—107	..
65,500	,,	June 26	4	4%	Do. B	115—118	80—85	..
4,940,000	,,	May 14	9	4½%	Do. 4 p.c. Deb.	92—94	66—69*	66—66½
1,235,000	,,	Feb. 12	3½	3½%	Imperial Continental	150—160	79—84	80—81½
235,242	,,	Mar. 12	6½	6½%	Do. 3½ p.c. Deb. Red.	84—86	62 - 65	..
2,498,905	,,	Feb. 26	10	5%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
306,083	,,	June 26	4	4%	Liverpool 5 p.c. Ord. (A)	211—213	82—83	..
75,000	5	June 11	6	2/-	Liverpool 5 p.c. Ord. (B)	146—148		
250,000	100	April 1	4½	4½%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
541,920	20	May 28	4	6/-	Malta & Mediterranean	4⅛—4⅝	3⅞—4⅛	..
1,875,892	Stk.	July 29	4½	4½%	Met. of Melbourne (4½ p.c. Deb.)	99—101	88—98	..
529,705	,,	June 26	3½	3¼%	Monte Video, Ltd.	11⅛—12	8—8½	..
55,940	10	Feb. 26	7/14/0	7/-	Newcastle&Gatsh'dCon.	98½—99½	70½—71	70$\frac{3}{4}$
300,000	Stk.	May 14	8	8%	Do. 3½ p.c. Deb.	82—83	71—73*	..
60,000	5	Mar. 26	10	1/-	North Middlesex 7 p.c.	14—15	10—11	..
60.000	50	Feb. 26	13	12%	Oriental, Ltd.	117—122	101 -106	105—105½
100,000	50	,,	12	11%	Ottoman, Ltd.	7⅛—7⅜	2—3	..
52,000	50	,,	10	9%	Portsea, Island B	128—131	92—97	..
249,980	5	April 29	8	—	Do. C	118—121	85—90	..
499,960	5	June 26	5	2/6	Do. D	..	..	..
521,600	100	June 2	4	4%	Primitiva Ord.	5½—6	1⅞—2½	37/6
—	—	—	—	4%	Do. 5 p.c. Pref.	4$\frac{3}{4}$—5	2$\frac{3}{4}$—3½	55.—60/-
346,198	Stk.	June 26	4	4%	Do. 4 p.c. Deb.	91—93	73—80	78½
150,000	10	May 14	6	6/-	Do. ,, ,, 1911	..	..	..
125,000	50	July 1	5	5%	River Plate 4 p.c. Deb.	85—87	59—61*	..
135,000	Stk.	Mar. 12	10	10%	San Paulo (6 p.c. Pref.)	10½—11	7⅞—8¼	8
209,984	,,	,,	10	10%	San Paulo (5 p.c. Deb.)	47—49	40—42*	..
523 500	,,	,,	10	10%	Sheffield A	223—224		
90,000	10	May 28	9	6/-	Do. B	223—224	178—182	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	Do. C	220—222		
1,895,445	,,	July 10	3	3%	South African	10½—11⅜	8½—9⅜	..
224,820	,,	Feb. 26	8½	8%	South Met. 4 p.c. Ord.	111—113	73—75	74—74⅜
952,795	,,	,,	6	48/4	Do. 3 p.c. Deb.	72½—74½	56—58	..
60,000	,,	,,	5	5%	South Shields Con. Stk.	157—159	140—142	..
135,000	—	—	—	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
647,740	,,	May 14	5	5%	Do. West Kent	..	..	..
120,000	,,	Feb. 12	7½	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88*	..
782,275	,,	,,	6	3⅜%	Southampton Ord.	99—102	76—78	..
181,255	,,	June 26	4	4%	Tottenham (A 5 p.c.)	135—138	95—100	..
182,380	10	Dec. 30	5	—	Tottenham District (B 3½ p.c.)	115—117	68—73	69½—70
149,900	10	July 1	5	5%	Tottenham District (4 p.c. Deb.)	87—89	63—65	..
236,476	Stk.	Mar. 12	5	5%	Tuscan, Ltd.	5—6	1—2	..
					Do. 5 p.c. Deb. Red.	93—95	60—65	..
30,000	,,	Feb. 26	8⅜	80/-	Tynemouth 5 p.c. max.	108½—109½	89—91	..
255,636	,,	,,	6¼	65/-	Wandsworth, Wimbledon, and Epsom—			
108,075	,,	,,	5/17/3	56/-	Wandsworth A 5 p.c.	151—156	114—119	..
352,000	,,	,,	6½	58/9	Do. B 3½ p.c.	129—134	99—101	..
98,000	,,	,,	6⅝	65/-	Do. C 3½ p.c.	110—115	86—91	..
88,416	,,	June 26	3	3%	Wimbledon 5 p.c.	117—122	88—93	..
					Epsom 5 p.c.	121—126	96—101	..
					3 p.c. Deb. Stk.	66—69	50—53*	..

* Ex. Div.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Airdrie Gas Department. Applications by July 19.

CHIEF CLERK AND ACCOUNTANT. No. 6324.

REPRESENTATIVES. No. 6316.

SULPHATE MAKER AND YARDMAN. Tiverton Gas-Works.

STOKER. Tiverton Gas-Works.

Plant, &c. (Second Hand), Wanted.

PURIFIERS. Halesworth Gas-Works.

Plant (Second Hand) for Sale.

REVERSING, BYE-PASSING, AND MAIN STOP VALVE. Redman, Arnside.

STATION GOVERNORS. Tipton Gas Department.

Meeting.

COMMERCIAL GAS COMPANY. Cannon Street Hotel, Aug. 16, Twelve o'clock.

TENDERS FOR

Brass and Gun Metal Goods.

SALFORD GAS DEPARTMENT.

Coal.

MACCLESFIELD GAS DEPARTMENT. Tenders by July 28.

WIGAN GAS DEPARTMENT. Tenders by July 13.

General Stores (Castings, Tubing, Iron and Steel, Lead Pipes, Oils, Paints, &c.

SALFORD GAS DEPARTMENT.

Meters.

SALFORD GAS DEPARTMENT.

Retort Setting, &c.

CLEATOR MOOR URBAN DISTRICT COUNCIL. Tenders by July 20.

Tar and Liquor.

HORSHAM GAS COMPANY.

MALVERN GAS DEPARTMENT. Tenders by July 23.

GAS JOURNAL

LIGHT ⁂ HEAT ⁂ POWER ⁂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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VOL. CXXXIX., No. 2827.] TUESDAY, JULY 17, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Sliding-Scale in Disgrace.

THE sliding-scale as applied to gas prices and dividends appears to be in deep disgrace at the present time—in both this country and America. From an early period in the war, the "JOURNAL" has drawn attention to the actual, and possibly worse, effects upon dividends and capital values of the operation of the system in exceptional circumstances. Gas companies have also approached the Gas Companies' Protection Association and the National Gas Council in regard to these effects. The former in response adopted a *non possumus* attitude; the latter moved, but were met in their turn by a similar attitude on the part of the Board of Trade, who may have been influenced by the inertia and "nothing "attempted" policy of the Protection Association. Temporary relief is all that is asked for, pending the time when the terms of the sliding-scale can be generally remodelled in order to compass extraordinary emergencies and to bring it into harmony with the changes of conditions—in respect of materials, labour, and so forth—when an approximate assessment of them can be made, that have arisen since the application of the system. The word "impossibility" blocks relief—relief desired more particularly by those who are dependent upon incomes from an industry which they had thought to be almost as safe, come what might, in its returns upon investments as Government securities. The remarks of Mr. Edwin Upton at the recent meeting of the National Gas Council are recalled [see "JOURNAL" for June 12, p. 515]; and there is also knowledge of gas stock holders who think there is something radically wrong with a system that can "let them down" in the dismal manner that the sliding-scale has done when their outgoings in all directions have taken upward flight through the national demands, higher producing costs, and undue profiteering. "Impossibility" in such a small thing in the case of a nation that has created an army such as we have, provided munitions that have astonished even enemy braggarts, and that has brought so much into operation in the way of war-time control! The ex President of the Institution of Gas Engineers (Mr. A. E. Broadberry), in his Presidential Address, also, in effect, declared that the sliding-scale has encouraged lax upkeep and provision of reserve plant. That, however, is a matter of mal-administration; and it is a very perfect system that can be made quite fool-proof. While prudence dominates the Boards of gas directors which we know most intimately, there is agreement with Mr. Broadberry that there are improvident Boards. Now we have the Massachusetts Board of Gas and Electric Light Commissioners, after nine-and-a-half years' experience of the working of the system in connection with the Boston Consolidated Gas Company, speaking in anything but commendatory terms of the results of its operation, and caring little whether or not the system is completely withdrawn.

In this connection, we should like our American friends to be clear about the views almost consistently held in this country regarding the sliding-scale. Though there are to-day plenty of people massed in favour of its amendment to secure better protection for stock and share holders, a distinct difference is drawn as between the operation of the system in normal and abnormal times. It is a defect of the system that it makes no provision for extraordinary conditions such as those of the present; and the other defect is that it has been moulded and continued in such definite form that it allows no opening for revision under competent sanction when permanent changes have come upon the financial conditions—such as costs of operation in respect of materials, labour, taxes, and so forth, which are removed from any governing power on the part of the undertakings. These conditions had set-in here well before the war; and we now know that the old standards of costs are permanently cast at a higher level. But otherwise there is the firmest belief in the principle and the intrinsic and practical value of the sliding-scale—providing the conditions of the times are in proximate harmony with the terms on which the system was instituted—as regulating the position between consumers and company, as giving confidence, and as creating a partnership between patronage and good management. The Massachusetts Board do not absolutely condemn the sliding-scale as worthless—in fact, they do not question its theoretical soundness, but "its conversion from a working theory "into a fixed rule, expressed in any given case in the inter-"relation of a standard dividend with a standard price may "be another matter." However, comments and recommendations which are brought out in an article elsewhere in this issue, are indicative of their views. The recommendation that it is inexpedient to extend the sliding-scale to the other gas companies of the Commonwealth admits of no other meaning than that the Commissioners' experience is that there is no particular value in the system. They compare the results of the Boston Gas Company with those of other gas companies; and they find that, in manufacturing costs and in charges to the consumers, the companies who are not under the sliding-scale are doing equally as well as the Boston Company.

But the Board have not had experience of the sliding-scale in the case of a company that is an entity without such subsidiary company connections as operate in the case of the Boston concern. This might make a considerable difference. From one of these companies the Boston Company purchase gas; and consequently the cost of the gas into the holder is regular over long periods. To the extent that gas is purchased in this way, the Boston Company have not the advantage of dealing with the secondary products of the coal carbonized; and in this way the operation of the sliding-scale is, the Commissioners hold, deprived of the business skill and sagacity that would be bestowed upon their production and marketing by the Boston Company. It will be seen from this that there are exceptional circumstances surrounding the only direct experience that the Board have had of the results of the sliding-scale; and this discounts much of their criticism and the recommendation quoted as to the inexpediency of applying the system to other gas companies in the State, and which decision also reflects the view of the companies themselves, who have expressed no desire to come under the system. At the same time, the deductions of the Board from the Boston experience as to the effect on the operation of the sliding-scale of working with subsidiary companies, must not be regarded as settling whether or not there is advantage in such a system. Advantage or otherwise depends upon financial relationships and operations. We can conceive of schemes of auxiliary co-operative companies through which considerable economies might be derived by concentrating gas manufacture, and by working-up and dealing with secondary products on the large scale, with a resultant profit far in excess of what could be realized by any amount of business skill and sagacity exercised by the individual Boards. Circumstances alter cases. But it is certain that the Commissioners are convinced that the association of the Boston Gas Company with the subsidiary companies is not to the advantage of the Boston consumers; for "the trading relations of the affiliated companies "of the Massachusetts Gas Association forced upon the

"Boston Company by their common ownership, are incon-
"sistent with the purpose and theory of the sliding-scale
"as a scheme of regulation." Again: "If profits can
"reach the stockholders of a gas company under the sliding-
"scale by any other means than through its dividends, the
"basis of control is impaired if not wholly destroyed." The report indicates a condition of affairs which has no parallel in this country. Taking all the circumstances into account, the Board recommend that the Act applying the sliding-scale to the Boston Company shall be repealed unless the undertaking is entirely dissociated from the Massachusetts Company. In this event, the Board propose new legislation, which, with their criticisms of other matters, will be found in the article on a later page.

If "faint praise damns," then this report, which is destitute of traceable commendation, means that the sliding-scale is not going to make any further headway in Massachusetts, nor probably in any other of the American States. But the report itself indicates that general judgment has been formed on a basis of experience that (unless another complexion can be put upon it by the Boston Company) is vitiated by unusual circumstances, and not the most congenial to the effective working of the system.

High Makes and Charge-Steaming at Macclesfield.

Large makes per ton of coal of good combustible gas, and up to statutory calorific standard, is a condition that all gas engineers desire, but all cannot attain for various reasons —sometimes because their carbonizing plant is inefficient, sometimes on account of the character of the coal employed. However, the great point of immediate and prospective interest is how to realize the largest makes per ton of given coal, and supply consumers with gas of good flame temperature at as low a price as possible, and not gas so adulterated with inert constituents that flame temperature is seriously depreciated. The Coal Controller, advised by Mr. Thomas Glover, has lately been urging, with the view to aid coal economy, the dilution of a good quality coal gas with blue water gas cheaply made from coke; and a large number of gas engineers are complying. Mr. J. E. Blundell, at Macclesfield, is accomplishing the same end by passing steam through the charges in his Glover-West vertical retorts, and so has increased the nominal producing capacity of his plant by about 25 p.ct. The steaming of charges is an old proposition that has been little practised; but the relative advantages of steaming in the retorts, and of separately making blue water gas and then diluting the coal gas with it, have been the subject of spasmodic discussion on the Continent. Generally, the separate practice has been preferred; but this has been under conditions different from those of Mr. Blundell. Still, under his conditions, it will have to be shown that steaming has no deleterious effects upon the retort structure, and information will be required as to fuel and coke-for-sale results, and the chemical characteristics of his gas and tar, in order to arrive at a definite decision.

These other particulars, which will either make complete the case for steaming in Glover-West retorts or will give ground for considerable debate, will probably be supplied before long by Mr. Blundell in a paper to be read at a meeting of one of the technical organizations. Meantime he has kindly supplied us with just sufficient information for an article which will sharpen interest, lead to a turning-up of notes on similar investigation, and probably induce other gas engineers in a position to do so to prosecute research on their own account. However, here we have the facts presented that, from a mixture of Yorkshire, Derbyshire, and Staffordshire coals, Mr. Blundell is getting with steaming—these are figures from two separate tests—from (say) 15,200 c.ft. to 15,500 c.ft. of a gas round about 510 B.Th.U., with tar-washing; and during May and April he was making per ton of coal 15·7 gallons of tar and 33·35 gallons of 10-oz. ammoniacal liquor. These figures are highly interesting, and deserving of congratulation. We have not for publication an analysis of the gas. This is reserved. But analyses of different samples have been seen; and we can vouch that they show satisfactory figures in respect of the percentage of inert constituents. In realizing these results (so the investigations have fully satisfied Mr. Blundell), an all-important point is the question of suitable heating of the retorts—the temperatures throughout the vertical length, and the zone of highest temperature. The Glover-West system of heating by means of separate chambers enables the regulation of temperatures precisely as and where required; and the researches have led to the decision that the highest temperature should be towards the lower end of the carbonizing portion of the retort. From a series of experiments to determine this, it has been found that the improper distribution of heat could easily give a gas with a high content of carbon dioxide, which in properly heated chambers is converted into carbon monoxide.

In the article, the subject recurs (after long rest) as to the advantage or otherwise of a free space at the top of the vertical retort. Mr. Blundell has made experiments in this direction; and he finds that a free space of larger volume than is the usual practice shows that "an increase of heavy "hydrocarbons in the gas is obtained, which indicates that "it is possible that the production of water gas within the "retort may be still further increased without detriment to "the calorific value"—of the total gas. More information will be required on this point. In his Institution paper in 1906, Mr. Thomas Glover gave excellent theoretical reasons for increasing the free space at the top of the retorts. The theory is that the splitting-up of the complex molecules which would otherwise go to make tar is done by the radiant heat within the free space above the coal during the time the volatile products pass to the ascension pipe from that part of the charge where they were liberated. The free space has also its disadvantages. Much knowledge as to carbonization, drawn from experience and chemical and physical research, has flowed during the past eleven years; and the practice now is heavy charges—in some cases full retorts—and longer duration carbonization. Free space is very largely ignored, or much reduced. More of the former provision in this respect has been occupied with coal with considerable carbonizing advantage and with a proved lessened destruction of gaseous constituents. But now it seems that Mr. Blundell with vertical retorts is proposing to retrace his steps to a larger free space. A solid balance of profit must be shown. Again, we take it, the necessary data will all be forthcoming in good time. However, there is intimation in this connection of a still larger production of gas per ton of coal carbonized with steaming, "without detriment to "the calorific power." Already upwards of 15,000 c.ft. are shown; mouths will water at (say) 16,000 or 17,000 c.ft. However, without being too hopeful before the whole of the facts are available for examination, the information so far disclosed certainly warrants the view that investigation and practice are under way at Macclesfield which will be very valuable in these times.

Gas and Electricity Regulations in Germany.

In the brutal work of murdering British civilians and of destroying their homes, the nocturnal journeying Zeppelins have now been succeeded by daylight raiding aeroplanes, which the docile and credulous people of Germany believe are engaged in demolishing works of military importance. In the nights when the Zeppelins came, in order to render their occupants as little assistance as possible in their vile mission, all sources of illumination that were likely to act as guides to the men thousands of feet overhead with bombs for the defenceless sleeping men, women, and children below were brought under regulation and control; and this had the effect of reducing not only the consumption of gas and electricity, but proportionately of the materials used in the production of these lighting agents. But the war—would that some other cause had ruled!—has brought to both its business compensations, in increased industrial demand for munitions work, and, through the trouble with coal distribution, demand for domestic heating. Suggestions have also been made by the authorities with the view to realize still further consumption economies. But the many operations of the gas industry for the nation, and the contribution that electricity is making to industrial power supply in connection with munitions manufacture, place both industries—that of gas supply in particular—on such an indispensable plane that there is little or no chance, without damaging production efficiency, of effecting further economies. Germany appears to have entered upon a period in relation to gas, electricity, and coal supply considerably worse than that now being experienced in this country. Though the inhabitants of the enemy country had difficulty last winter (which was a severe one) in obtaining all the coal they required, and so in Berlin exhausted the stocks of gas and electric heaters, the edict has now gone forth that there is to be a reduction in the consumption of gas and electricity, which, through the war and the general shortage of coal, has

been ascending by leaps and bounds. The prospect does not look a particularly happy one for the people of Germany next winter, with the available coal still more diminished perhaps than last winter, and the consumption of gas and electricity more rigorously disciplined. What happened in Berlin last winter in regard to the exhaustion of gas and electric heaters, no doubt occurred in most other parts of Germany, which has probably no metal to spare now for the production of such aids to human comfort as gas and electric fires. As a matter of fact, the installation of new gas fires and stoves has already been forbidden in Frankfort and certain other towns.

This prohibition should assist in preventing the increased use of gas and electricity for domestic heating; but, as here, those responsible in Germany for producing regulation—a Special Central Electricity and Gas Department has been created—find it somewhat difficult to make prescriptions for the lessening of the consumption of gas. The obstacles to a reduction of consumption other than from favourable atmospherical conditions, under the circumstances of gas supply, were discovered in this country when the celebrated 10 p.ct. request of the Board of Trade was first promulgated, which request died a natural death. Germany has no alternative but to decree a 10 p.ct. reduction of the consumption of electricity, which it is expected will be extended from Berlin to the whole of the German Empire. Nevertheless, the supervising body are not without hope of finding some way of applying restriction to gas. It will be extremely interesting to learn what lines, if any, are found practicable. It will also be interesting to know whether the compulsory reduction in the use of electricity—this, of course, does not apply to the war material-producing industries—is to bear any penal consequences for non-compliance, as well as the lines on which saving is effected.

The "Vossische Zeitung," from an article in which the information (given here and elsewhere in this issue) is obtained, and for drawing attention to which we are indebted to an old friend, suggests that consideration shall in the first place be bestowed upon lighting, in which direction German towns, and particularly in buildings of public resort, appear to have gone in for quite a barbarous debauch in illumination—the lighting having been continually on the increase with augmented dazzle, and therefore with injurious effect on the eye. All this our authorities have suppressed here by their regulations. The "Vossische Zeitung"—it is the way of lay writers on such matters—thinks the question of producing a reduction is a perfectly easy one for the people. "All that one has to do is to look at one's electricity "bill for the previous year and using one's electricity meter, "to arrange to use 10 p.ct. less than one did before." Very good; it sounds so simple. The householder, however, will ask, "How much electrical energy did I use on July 17, or "any other day last year?" He cannot tell; and neither his meter nor his account can inform him. He is nonplussed; and, desirous as he may be to comply, he is deprived of a basis upon which to go. It would therefore be unsafe to adopt the suggestion. But an alternative way is proposed. It is that existing lamps be changed for ones of lower candle-power, or the length of the time of lighting be curtailed. The latter is a course that recollection does not enable one to take with confidence, and atmospherical conditions come in to disturb the plan. The suggested change of lamps means something which would break down the present resources of German makers, who have put up their prices, which, even were supply abundant, would act as a deterrent. But the suggestions only refer to lighting. What of the other directions in which electricity is used, apart from munitions work? Moreover, 10 p.ct. reduction in the consumption of current does not necessarily mean 10 p.ct. reduction in the consumption of coal. The consumption of coal per unit of output largely depends on the load on the generating plant.

We do not envy the work of Prof. Kübler, who has been entrusted with the management of the Special Central Electricity and Gas Department. But in Germany they have a more brusque way of insisting on the observance of their decrees in such matters than we have in this country. So if 10 p.ct. reduction in electricity has been ordered, no doubt 10 p.ct. there will be, with something over as a margin of safety. Be that as it may, there is no harm in congratulating ourselves that we have not in this country come to quite such a serious pass in the matter of coal, gas, and electricity supply as the information suggests is the case in Germany.

Benzol and Competition.

Just recently particulars were given in these columns regarding the high dividends paid by some of the oil companies [June 26, p. 617], the Shell Transport Company among them; and, in a preceding paragraph in the same issue, there was reference to what is to happen in placing the increased production of benzol on a strong commercial footing after the war. It will be remembered the National Gas Council have their eyes on cultivating business for motor car purposes, in which connection benzol will not, as before pointed out, be allowed a "walk over" by the extraordinarily strong financial concerns which govern the oil market. This may be taken for granted. It is obvious from what transpired at the meeting of the Shell Company last week that there is very close co-operation between some of the more important oil companies, and this co-operation has to be reckoned with. A couple of passages, too, from the speech of the Chairman (Sir Marcus Samuel, Bart.) provide an earnest of future intentions: "The Directors are of opinion that commercially the Company's enterprises are laid upon such sound foundations, and are so well equipped, that they have nothing to fear from any new schemes or competitors. Nevertheless the Directors will continue to further strengthen the producing and selling organization, based upon the knowledge acquired in conducting this great and complicated petroleum business in every part of the world."

In Search of the Right Grade of Gas.

When the Institution of Gas Engineers met in June, it had a Gas Heating, Lighting, and Ventilation Research Committee. Apparently from the minutes of the last meeting of the Council, the Committee has been rechristened the "Gas Components Committee." It does not matter, however, by what name it is known; the task before it of investigating, without being limited by any calorific value standard, the grade of gas that offers economy and a high flame temperature is one of vital importance to the industry, with competitors searching in every nook and corner for contributions to more economical working on their part. It is a battle of brains in the industries that is now proceeding for the coming great industrial and commercial revival and development. We are interested in seeing that both the South Suburban Gas Company and the Birmingham Corporation Gas Department have placed at the disposal of the Committee their valuable resources and assistance in the prosecution of the research. The Chairman of the South Suburban Company (Mr. Charles Hunt) has been keenly interested in this question of more economical gas production, and the attaining of high flame temperature by supplying consumers with a gas well favoured in the percentage of combustibles; and when the question was introduced in the "Journal" as one that with the movements of competitors and after-war requirements should be taken in hand, Mr. Hunt wrote to say that the Company were undertaking an inquiry on the lines suggested [see April 24, p. 152]. The offer of the Birmingham Gas Department is also one for which the industry will be particularly grateful, in view of the working-scale experimental plant possessed by it, and the ability there to work under all possible conditions of carbonizing temperatures and dilution. Besides, on the chemical staff, headed by the Chief Chemist (Mr. E. W. Smith, M.Sc.), are men who, long accustomed to research work, will be only too glad to render Prof. Cobb and the Committee all possible assistance.

Gas-Works of Local Authorities.

The difficulties which have had to be faced and overcome in the past financial year continue to be emphasized by the reports which have come to hand the last week or two in regard to the working during the twelve months to March of certain municipally owned gas undertakings. In the case of Belfast, the gross profit on the manufacture and sale of gas and residuals is less than half what it was a year ago; but, apart from high costs, there is every cause for satisfaction—the output of gas showing an increase of 72 million c.ft. In fact, "the citizens are coming to realize that for convenience and economy gas is the best medium for lighting, heating, or power purposes." At Blackburn, on the other hand, where is a net loss on the year's working of £4639, the consumption of gas shows a decrease of 6¾ p.ct. As to Carlisle, the gas-works net revenue account for the year shows a deficit of £298, making, with the adverse balance brought forward from last year, a total deficit on his account of

£773. The gross profit is greater at Coventry; and of the surplus £5000 is to be paid over in aid of the rates. At Heywood there is a trifling net loss, which is accompanied by a decrease in the quantity of gas sold. From Kendal comes an interesting comparison between the results attained with horizontal retorts and the new installation of Woodall-Duckham verticals—the latter exhibiting a large net saving in cost. The quantity of gas sent out was 6½ per cent. less than in the previous year.

Further Figures.

Another instance of an increased gross profit is to be seen in Leeds, where the sale of gas increased by close upon 5 p.ct. While less is used for lighting purposes, the war has created a great development in the gas-furnace branch. It has, in fact, increased the consumption for this purpose by 180 p.ct. The accounts at Mossley show there is a net loss of £725 on the past year's working; the quantity of gas sent out from the works having fallen off to the extent of practically 6½ p.ct. It is pointed out in the report that the charges for capital, taxes, and rates amounted to more than one-third of the total revenue. The net profit of £2240 at Oldbury compares with £3277 a year ago. Here, again, more gas was sold for power purposes. There is reported from Ossett a decrease of somewhere about 5 p.ct. in the quantity of gas sold—due to lighting restrictions and the Summer Time Act. After deducting interest and sinking fund charges, there is a loss on the year's working of just under £1000. But 75 p.ct. of this is represented by the increased amount paid for income-tax. As to Rochdale, the net profit of £3741 compares with £15,000 a year ago. The gross profit is only £6000 less; but there is an increase of £5000 in the charge for income-tax, which further materially lessens the surplus. As the sum available is inadequate to meet the annual charges for reserve fund and working capital, there is a debit balance on revenue account at the commencement of the new financial year. The gas sold at West Bromwich increased 1 p.ct.; a considerable reduction over the first nine months of the year being more than recovered in the last quarter. There also comes from Workington an interesting comparison, relating to Woodall-Duckham vertical retorts. It is stated that "the price of gas would have been at least 8d. per 1000 c.ft. more," if they had been working on the old lines. Considerably more gas was sold; and the gross profit is somewhat higher.

Coke and Electrical Station Engineers.

Truth will out. The Coal Controller's recent suggestions as to how to save coal have dragged truth into prominence. There are electrical people who want no fuel connections with the "shop next door." Fear as to some terrible hidden results possess them. The "Electrical Times" confesses as much. Recommendation No. 2 [*ante*, p. 75] counsels the use of locally produced coke as much as possible in lieu of coal. Our contemporary fences with the proposition—not with real ascertained data, but with arguments that have their antitheses in other experience. It knows of works that started to burn coke or coke breeze, after spending a good deal of money on furnace adaptation, but found the fuel ceased to be available. This is an admission of electrical foolishness and shortsightedness. Why was not a coke contract made, and so a supply assured? The objection to change is also raised that, using coke as fuel, those stations without spare boiler capacity could not meet their present load. Very well, what about those that have spare plant? We are to-day searching for economy, and not for grounds for cavilling and obstruction. In the tail of this particular comment of our contemporary truth and cause are found combined. They say: "Also there is a pretty general feeling that coke feeding puts the electrical people at the mercy of the gas interests." There is material evidence that such a timid feeling does not exist generally among electrical engineers. What does it matter to them where their fuel comes from, if by its use there are shown good evaporative duty and plant efficiency, and low fuel cost per 1000 gallons evaporated? As to a business alliance with the gas industry, does not electricity give electrical undertakings sufficient stability to resist any danger from coke buying? If not, there is hollowness in the noisily promulgated virtue of their commodity for doing practically everything better and cheaper than it has ever been done before. There is one other point. If there is so much wrong with coke-feeding from the gas industry, why is the electrical industry still talking so much of coal carbonization on its own account? Is it going to gasify all the coke it hopes to make, or feed it direct into boiler furnaces? There are central station engineers who, despite the "Electrical Times," are at the present time putting boilers in a condition for coke use. Perhaps a little meditation over the data presented with Mr. E. W. L. Nicol's article on June 19 [p. 576] will counteract the timidity which our contemporary admits does exist—if not in fact, in its own fertile imagination.

Abbreviations and Symbols.

Abbreviations and symbols should only be used in writing or any publication for the public eye on two united grounds—economy of space and time, and if they do not depreciate the educational value of the published material by importing into it something that is not appreciated by all readers. The Institution of Heating and Ventilating Engineers are proposing the unification of symbols and abbreviations used in the science and practice of heating and ventilation; and the Council of the Institution of Gas Engineers have been invited to consider the matter. The latter have decided that, while the present is an inopportune time for coming to a decision on so important a question, they are prepared—provided the proposal is approved by other technical bodies—that the term "therm" should be adopted in place of "B.Th.U.," to distinguish it from the B.T.U. (Board of Trade electrical unit), and that the symbol shown elsewhere should be employed to denote it. The list of contractions and symbols as suggested are reproduced on p. 106. But for the life of us we cannot see what gain they are going to be over recognized abbreviations, which are thoroughly well understood, as they carry on their face their meaning. Take, for example, the proposed contraction "therm." There is no saving of either space or time in its use over "B.Th.U.;" and if the "h" adjoining the "T," as well as the context, is not a sufficient safeguard against confusion with "B.T.U.," then surely there must be a deficiency somewhere or gross carelessness on the part of the erring person. Fancy speaking to the man in the street of a gas of 500 therms., or putting before him an account of the efficiency of something or other with the (to him) mysterious expression in it composed of the symbols for "therm" and "per." He would very properly eye one with a great deal of misgiving. What real gain, too, is there in using "ft.^{2}" or "in.^{2}," or any symbol, for "sq. ft." or "sq. in." The same with "ft.^{3}" and "in.^{3}" for "c.ft." or "c.in." There is much more likelihood to be confusion promoted by the misreading of the "^{2}" and the "^{3}" than there could possibly be by the "sq." or "c." The other suggestions for contractions or the use of symbols refer to expressions so rarely required that there is little use troubling about them. Unless there is some real gain, let us keep to expressions that are understood by all—by the showroom man, the fitter, and the customer alike with the engineer, manager, and chemist—for, in so doing, we shall be conferring the greatest benefit. We do not want to use a few symbols or unusual contractions merely to give printed matter a pseudo or added scientific appearance.

Société Technique du Gaz en France.

The annual general meeting of the Société Technique—held recently in Paris, and the occasion of the short papers already published in the "Journal"—was followed by a luncheon, of a simple character appropriate to the times, at which M. Rouland briefly reviewed the affairs of the Society, and paid a warm tribute to the sister association, the Professional Syndicat. In this connection he acknowledged in cordial terms the untiring effort on the part of the French gas industry of the President of the Syndicat, M. René Masse. M. Masse, in responding, expressed the indebtedness of the gas industry to M. Rouland. Among other guests at the luncheon were M. Gabelle, the Director of the Conservatoire des Arts et Métiers, and Mr. R. S. Gardiner, who, as representing Great Britain, was accorded a very hearty reception. M. Rouland has been re-elected President for the year 1917-18. The Vice-Presidents are: MM. Delebecque, Kaeuffer, and Laurain. The Secretaries are: M.M. G. Gauthier and R. d'Estape.

Nitrogen Fixation in Germany.—The "Chemical Trades Journal" says that the production of ammonia in Germany by the Haber synthetic process, according to the "Frankfurter Zeitung," rose from 30,000 tons in 1913 to 60,000 tons in 1914, to 150,000 tons in 1915, and to 300,000 tons (estimated) in 1916. An output of 500,000 tons of ammonia is anticipated for 1917, containing 100,000 tons of nitrogen. At the same time 700,000 tons of sulphate of ammonia (140,000 tons of nitrogen) and 400,000 tons of calcium nitrate (80,000 tons of nitrogen) are expected to be produced—the total including 320,000 tons of nitrogen, which exceeds by 100,000 tons the entire consumption of nitrogen in Germany in 1913.

PERSONAL.

Mr. ARCHIBALD STEWART, Assistant at the Airdrie Gas-Works, has been appointed Gas Manager at Blairgowrie. He succeeds Mr. Andrew Terrace, who recently resigned.

Mr. T. J. C. JORDAN, the younger son—he is only just 18 years old—of Mr. Thomas W. Jordan, the Managing-Director of the Manchester Paint and Varnish Company, has joined the Mechanical Transport Section of H.M. forces.

The Bradford Corporation Gas Committee have appointed Mr. A. R. KNIGHT to be Assistant Chemical Works Manager and Works Chemist, and have advanced the salary of Mr. PERCY WARD, the Manager of the Chemical Works, from £200 to £350.

Captain E. W. BROADBERRY, of the 1st/7th Essex Regiment and the R.F.C., eldest son of Mr. A. E. Broadberry, M.Inst.C.E., the Engineer of the Tottenham District Light, Heat, and Power Company, is in a hospital in London, recovering from a gun-shot wound in the leg.

At the Council meeting of the Institution of Gas Engineers on the 5th inst., Mr. ALEX. GEORGE CHEAL, of the Crowborough District Gas Company, and Mr. STEPHEN LACEY, of the Gas Light and Coke Company, were approved as candidates for membership; and Mr. GEORGE HARRY SHENTON, of the Rainford Gas Company, for associate membership.

The Directors of the European Gas Company, Ltd., in their notice to the shareholders calling the annual meeting for to-day, record, with much regret, the death of their colleague, Mr. HENRY C. SMITH, and of Mr. H. J. LUFF, one of the Auditors. Pursuant to the regulations of the Company, the Directors have filled up the vacancies—nominating Mr. JOHN MEWS as a Director, subject to confirmation by the shareholders at the meeting, and Mr. G. C. GOLDSMID to act as Auditor until to-day.

OBITUARY.

JOHN MILES.

IN his 77th year, and after a busy life, during which he never lost touch with the gas industry, Alderman John Miles, J.P., of Bolton, passed away on the 5th inst., at his residence, "Lyndene," Heaton. For some time past, his health had occasioned anxiety; and eventually the end came from heart failure. By many friends in the industry, to whom he was well known through his regular attendance at the meetings of the Institution of Gas Engineers—his membership extended over fifty years—as well as owing to the interest in gas matters evinced by him in other ways (and to older members of the profession, of course, as a gas manager), his death will be much regretted; and sincere sympathy will be felt with the widow and family in their loss.

Alderman Miles was, as it were, born into the gas profession; for throughout his life his father, Mr. William Miles, was engaged in the management of gas-works—first at Blackburn (where Alderman Miles was himself born), subsequently at Great Grimsby, Market Rasen, Tyldesley, and Clitheroe. In the last-named town, he managed the gas-works for thirty years—from 1866 onwards, On leaving school, the son joined his father at the Tyldesley Gas-Works, in the management of which he eventually succeeded him. He remained there until 1869, when he transferred his services to the Rochdale Corporation; but a year later he went to Bolton, to take part in an india-rubber and steam-engine packing business. Of this business he eventually became sole proprietor. Other commercial undertakings with which he was connected, readers of the "JOURNAL" need hardly be reminded, included Meters Limited, of which he was Chairman.

Soon after taking up residence in Bolton, he entered the public life of the town, and occupied a seat in the Council uninterruptedly for a period of over forty years. After two years' service as a member of the Gas and Lighting Committee, he was made Vice-Chairman; and in 1887 he succeeded Alderman Moscrop as Chairman of the Gas Committee, which position he retained for many years. On his initiative the deposit system was abolished, except in special cases, and the use of prepayment meters was encouraged. When he retired from the department, his loss was much felt; the employees showing their appreciation of his work by presenting him with a portrait in oils and a handsome service of silver plate. For several years, also, he was Chairman of the Electricity Committee, and was twice Mayor—the second occasion being in the Coronation year of King Edward VII., when he represented Bolton at the State celebrations in London. From 1903 until the time of his death he was Chairman of the Tramways Committee—the last meeting attended by him being as recently as three weeks ago.

Many other public positions were held by Alderman Miles, who was also an earnest Mason and a capable musician. For more than fifty years he was Organist and Choirmaster of the parish church at Deane. At the end of 1888, he was placed on the Commission of Peace for the borough.

Mr. G. S. KENDALL, the Gas Engineer and Manager to the Stratford-on-Avon Corporation, who for the past three months had been away from duty owing to ill-health, died last Sunday week. In April, 1916, when Mr. J. S. Cranmer retired from the position, and was made Consultant Manager, Mr. Kendall (who had previously acted as his Assistant) was appointed in his place. Before going to Stratford-on-Avon, Mr. Kendall occupied the position of Assistant Works Superintendent at Wolverhampton.

Mr. H. G. Warren, the London Agent and Secretary of the Danish Gas Company, has received official intimation that his youngest son, Second-Lieutenant ALAN JOHN WARREN, of the London Regiment, was killed in action on the 10th inst. Lieutenant Warren, who had not yet reached his twentieth year, was educated at King's College School, Wimbledon, and shortly after the outbreak of war joined the Surrey Yeomanry. Early in 1915 he was sent to Flanders, and later to Alexandria, *en route* for Salonika. He was, however, invalided home from Alexandria in December, 1915. Later he was gazetted to the 12th Company, London Regiment (Rangers), and returned to the front, where he remained up to the time of his death. His brother, REGINALD H. WARREN, who at the beginning of the war returned from Copenhagen to take service with the Colours, is in the Duke of Cornwall's Light Infantry.

CITY AND GUILDS EXAMINATION PASSES.

THE subjoined further names may be noted of successful candidates in the recent City and Guilds of London Institute gas examinations.

Gas Engineering.

FINAL GRADE—FIRST CLASS.

L. F. King, Huddersfield.
C. W. Surman, Maidstone.
J. P. Thompson, Barnoldswick.

GRADE I.—FIRST CLASS.

S. B. Dean, Longwood.
J. E. Nicholls, East Ham.

GRADE I.—SECOND CLASS.

E. Brown, Longwood.
P. Marsland, Longwood.

Gas-Fitting.

GRADE I.

E. Brown, Longwood.
S. B. Dean, Longwood.
P. Marsland, Longwood.

Gas Supply.

FINAL GRADE—FIRST CLASS.

J. M'Lusky, Huddersfield.
J. P. Thompson, Barnoldswick.

FINAL GRADE—SECOND CLASS.

G. G. Buttery.
L. F. King, Huddersfield.
R. J. Lacy.
F. E. Lawson.
L. V. Stanton.

GRADE I.—FIRST CLASS.

S. B. Dean, Longwood.
P. Marsland, Longwood.
William Tufft.

GRADE I.—SECOND CLASS.

E. Brown, Longwood.

GAS EXAMINATION PRIZE WINNERS.

Awards by the Society of British Gas Industries.

THE Secretary of the Society of British Gas Industries (Mr. Arthur L. Griffith) forwards the following list of winners of the prizes given by the Society in the City and Guilds of London Institute's recent examinations in "Gas Engineering," "Gas "Supply," and "Gas-Fitting" (Honours Grades).

GAS ENGINEERING.

First Prize, Final Examination, £3 3s.	Michael Barash, 8, Norfolk Street, Bury New Road, Manchester.
Second Prize, Final Examination, £2 2s.	John Robinson Hollies, 21, Heathcote Street, Kidsgrove, Staffs.

GAS SUPPLY.

First Prize, Final Examination, £3 3s.	John Bradbury, Bridge Street, Whaley Bridge, near Stockport.
Second Prize, Final Examination, £2 2s.	Jack Powell Thompson, 46, Shipton Road, Barnoldswick.

GAS-FITTING.

Final Examination.	The first prize was not awarded.
Second Prize, £2 2s.	William George Wright, 14, Cliff Street, Liverpool, passed first.

Illuminating Engineering Society of America.—The Council after careful consideration, have decided to follow the course taken by other societies, and have abandoned all plans for the annual convention of the American Illuminating Engineering Society, which was to have been held in Newark (N.J.) during September. This action was taken in view of the fact that the resources of the Society, both in personnel and finance, should be conserved to meet any emergency demand that might arise because of the war. The Executive Committee were authorized to consider the advisability of holding a short meeting to deal with questions of illuminating engineering having a bearing on the war situation. The Committee on Papers will complete arrangements with the authors of convention papers, as though the convention were to be held. It is proposed to circulate these papers, to obtain written discussions on them, and to publish both papers and discussions in the "Transactions."

THE SLIDING-SCALE AND THE BOSTON (U.S.A.) GAS COMPANY.

System has not Gained Favour in the Sight of the Commissioners.

Towards the end of the volume comprising the thirty-second annual report of the Board of Gas and Electric Light Commissioners of Massachusetts for 1916, several pages are devoted to an investigation of the conditions surrounding the application of the sliding-scale system to the Boston Consolidated Gas Company, in connection with which it has been in operation some nine-and-a-half years. So far as the Board is informed, it is still the sole instance in the United States in which this particular system of regulation has been tried. Passing over the work associated with the preliminary investigation, we come to a section of the report headed

Operation and Effect of the Sliding-Scale.

The report here says: The avowed purpose of the sliding-scale is to increase the incentives to economical and skilful management by the prospect of a definite and assured increase in dividends, and the public reaps the advantage thereby in prices decreasing correspondingly with an improvement in operating costs. It is urged on behalf of the Company that this has been its actual result. There has been unquestionably a decrease in the net cost at the burner of the gas sold during the period, due to the enterprise and commercial skill of the management. But the same is true of companies not under the sliding-scale, and is attributable to a greatly increased output without any corresponding increase in actual expenses. Undoubtedly, reductions in price have contributed to this result.

At the time when the Act took effect, the Company was producing in the old works already described such gas as it did not purchase. They were not then economical to operate; and the cost of producing gas was immediately reduced when concentrated in the new water-gas works at Everett. The cost has varried since, chiefly with the price of oil. But in addition to the expense of operating and maintaining such works, the computed costs include about ½ c. for the care of the old works when not making gas, although this would seem fairly a part of the cost of the purchased gas. Furthermore, gas purchased by the Consolidated Company from the Gas and Coke Company is taken at a uniform rate throughout the year, while the gas produced by the Consolidated Company supplements this supply, and varies in amount with the season of the year. This condition of uniformity of production operates favourably upon the unit costs to the Gas and Coke Company of the gas bought by the Consolidated Company, but unfavourably upon the unit costs to the latter Company of the gas made in its own works. There has been substantially no change in the cost in the holder of the gas purchased. Indeed, there has been an increase of approximately 1 c. when compared with the year ended June 30, 1906. This introduces a most important question directly affecting the operation of the sliding-scale as an effective means of regulation under existing conditions. The cost of coal gas is intimately related to the amount and value of the residuals recovered. The residuals must be disposed of in an open market. Consequently, no other department of the gas business presents an opportunity for a greater display of business skill and sagacity with a direct reflection in decreased costs. But, by reason of the existing conditions, the management of the Boston Company has no chance to apply skill and sagacity to its solution for the benefit of the Company. Because of the common ownership of the Boston and the Gas and Coke Companies, it has no opportunity to exhibit even shrewdness in the making of a contract for the purchase of gas upon the terms most favourable to the Boston Company.

The answer will doubtless be made that the price paid must be approved by the Board. This is true; but it is to be borne in mind that, by the terms of the Charter, the authority of the Board is limited to finding "that the price to be paid for the gas purchased is less than it would cost said Boston Consolidated Gas Company to make its gas in gas-works of standard type properly equipped, suitably situated, and of sufficient capacity to make all the gas required by the whole district supplied by the Company." It is comparatively easy to determine the production cost at works fulfilling the above requirements; but it is by no means easy to fix the standards for the recovery and marketing of a large output of bye-products. Even if the Charter of the Consolidated Company permitted this test, there is no way of determining with any accuracy the cost to the Gas and Coke Company of the gas sold to the former Company.

The Charter provision quoted was enacted in 1903 (long before the sliding-scale was thought of), and was suggested undoubtedly as a safeguard because of the known common ownership of the two concerns, and its possible use in exacting an unfair profit. Its inconsistency with a system of regulation dependent solely upon the self-interest of the Boston Company did not become apparent until the managers of that Company raised the price received by the Gas and Coke Company, to the latter's unquestionable advantage, justifying the new price on the ground that it was not greater than the demonstrable cost of making it "in gas-works of standard type," &c., including, of course, the investment charges on such works and taking into account the hazards of a market already saturated with the coke made in the gas and coke plant.

The Board has also called attention to another important phase of the Company's policy—namely, the manifest tendency towards the exhaustion of its resources through the payment of dividends not fully earned, and without any adequate provision whatsoever for depreciation. The disastrous results of such a policy, if long continued, need not be dwelt upon. An obvious answer, and one given by the Company, is that the reductions in price were, in the light of experience, made too promptly and in anticipation of savings in cost and attendant advantages. It was urged, moreover, that, without the incentives of the sliding-scale, costs "would not have been reduced to the extent to which they have been reduced," nor would the Company have anticipated such savings in costs, and reduced prices in advance of them. But it was also stated that "the incentive of the sliding-scale is first felt by the financial managers of the Company; they want more dividends." Dividends are, however, not fixed charges. They are not required to be paid even if permitted, and certainly should not be, if not earned. But if the immediate rewards, both direct and indirect, of this incentive are more important to the management than the permanent soundness of the investment, then the permitted dividends may be taken under the Act with an apparent immediate public advantage, whatever its ultimate effect, but without consulting that other member of the partnership as to which policy is in the long run in its best interest.

The Board ask that they should not be misunderstood. To be sure, a similar financial policy may be pursued by a company not under the sliding-scale, and perhaps without the accompanying immediate advantage of lower prices to the public. On the other hand, the self-interest upon which the sliding-scale as a system of regulation is founded, and a far-seeing, conservative financial policy should be identical. But where this relation has not been maintained, suspicion is aroused that the interests of the Company may have been subordinated to the needs of the holding "association," with its large issues of securities based primarily on the gas supply of Boston, and the freedom of action that is afforded by the sliding-scale has aided this result.

One of the strong advocates of the sliding-scale at the time of its adoption urged at the recent hearings with great force that the sliding-scale has taken the Company out of politics. No one will deny the importance of this result. But the scandals of the gas situation prior to the adoption of the sliding-scale appear to have been due more to the struggle of powerful interests for control than to the resistance of the Company to political attacks, or even to public insistence upon lower prices. The praiseworthy change in the attitude of the Company towards the public under the present management, to which allusion has already been made, has had an important effect upon its public relations, and would doubtless have been pursued with a similar result whether the sliding-scale had been adopted or not.

The Boston Company was the first in this State to reduce its price to 80 c. Its example unquestionably had a substantial influence upon the prices charged elsewhere. Its promptness in making its reduction, moreover, was perhaps due to a feeling of greater security in the pursuit of a definite policy because of the sliding-scale. But the fact that several of the other companies not under the sliding-scale have meantime reached this price, all (save two) voluntarily, and two others even 75 c., makes it evident that the sliding-scale has been no more effective this end than the system of regulation applicable to all other companies.

Conclusions and Recommendations.

No fair-minded person is disposed to question the theoretical soundness of the principle claimed for the sliding-scale as applicable to all public service corporations—viz., that decreased cost and increased profits, due to skilful and wise management, shall be shared in lower prices to the public and larger dividends to stockholders. This has been, in fact, a policy recognized and pursued by the Board for many years in dealing with questions of rates. But its conversion from a working theory into a fixed rule, expressed in any given case in the interrelation of a standard dividend with a standard price, may be quite another matter. Of necessity, such a system must project indefinitely upon the future the known conditions at the time of its adoption, and its operation must be left almost wholly to the initiative of the company. Where the choice is open, it is a serious question whether it offers in the long run any substantial advantage to the public, or even to the companies, over the system of regulation so long pursued in the Commonwealth. Its vogue in England is due, in considerable measure at least, to the fact that direct interference with gas prices is virtually unknown there, and that it is the alternative to the maximum dividend method of control under which a company is permitted to earn the maximum dividend and no more. But it is worthy of notice that, under the present desperate national stress, the sliding-scale companies appear to be under distinctly adverse conditions as compared with the maximum-dividend companies; and whether or not in the light of this experience maximum-dividend companies are as likely to go under the sliding-scale hereafter may be open to doubt.

This system of regulation for the Boston Company was deliberately adopted ten years ago, after an elaborate investigation and with the earnest support of a number of individuals who disinterestedly believed it to be in the public interest. The Board has not felt called upon to enter upon this inquiry as though the question were entirely novel, but rather as to whether the system has so failed to fulfil its promise as to warrant its repeal. Upon certain features of this problem, opinions may differ; but one thing is clear, that the trading relations with the affiliated companies of the

Massachusetts Gas Association, forced upon the Boston Company by their common ownership, are inconsistent with the purpose and theory of the sliding-scale as a scheme of regulation. If profits can reach the stockholders of a gas company under the sliding-scale by any other means than through its dividends, the basis of control is impaired, if not wholly destroyed.

It is immaterial to the owners of the securities of the Association whether the dividends which reach them come from the profits of the Gas Company or the Gas and Coke Company; but it is of vital importance to the consumer that, if his sole reliance for lower prices rests upon the incentives of the sliding-scale, no profits on the gas which he consumes shall be distributed save through the dividends of the Gas Company. Moreover, with a holding Association superimposed between the Gas Company and the investors, the essential feature of the sliding-scale system of regulation—namely, the sale of additional stock at auction—has been, and will probably always be, inoperative.

There is, in fact, reason to believe that, under the conditions which have existed, the sliding-scale has not had a fair trial; and, in the light of the experience of these ten years, there is no promise of any further reductions in price under it so long as the present relations with the other companies affiliated under the Association are maintained. Furthermore, the evils commonly attendant upon the control of public service corporations by holding associations are by no means diminished by the sliding-scale, and are destructive of any sound system of regulation which should safeguard the resources of the corporations under supervision in the interests of consumer and investor alike. Otherwise they may at the last, through the dissipation of their resources, become so enfeebled as to forbid any hope of adequate service at low prices.

In view of these considerations, the Board are of the opinion, and recommend, that the Act shall be repealed unless the Boston Company is entirely disassociated from the Massachusetts Gas Companies and its stock distributed directly among investors. If this is done, a few years of further experience should develop conclusively the relative advantages and disadvantages of this system of public regulation.

If the Act be continued on such terms, two other matters should be dealt with incidentally. The present Act permits a revision of the standard price after July 1, 1916, but only upon petition of the Company or the mayor of a city or select men of a town supplied. In the judgment of the Board, the consumers should not have their rights depend solely on the initiative of these officials, but should have the power to invoke directly the Board's authority in the matter. This section is also silent as to how frequently such revisions may be made; and it seems fair, if reliance is to be placed upon the sliding-scale system, that there should be reasonable intervals between such revisions. In earlier parts of this report it has appeared that the Company is in a measure embarrassed by its relatively large capital as compared with other companies of the State, because of a correspondingly high dividend charge. If its stock were now independently owned it would be in the interests not only of its stockholders, but of the public, that additional issues of stock entitled to share in the benefit of permissible increases in dividends should be kept at a minimum. In the English practice, the debenture and preferred stocks do not enjoy the right to the sliding-scale dividends; and yet a substantial proportion of the capital raised is by the issue of this class of securities. This, in the opinion of the Board, should be made a feature of the Boston Act.

The Board have also been directed to report their recommendations as to the "extension of the system." By this phrase, the Board understand the Legislature to mean the application of the system to companies other than the Boston Company. The East Boston, Newton and Watertown, and Quincy Companies are integral parts of one system, already physically united and interdependent, and kept apart legally merely by the accident of their early corporate existence. The same is equally true of the Dedham and Hyde Park Company, save that it is quite independently owned, and its situation is far more grievous, especially to the consumers of Hyde Park, which is now part of Boston, but does not enjoy the full benefit of that relationship. These Companies should be merged with the Boston Company, but not until the communities served are fully apprised that this step means that, unless the Sliding Scale Act is repealed, such merger involves virtually their inclusion under this system of regulation. This is a matter, however, requiring no new legislation.

So far as the other gas companies of the State are concerned, no demand for the extension of the system to them developed in the course of the Board's investigation. Indeed, it was stated, on behalf of certain of them, that they did not desire it unless upon the basis—proposed several years ago and denied by the Legislature—of capitalizing the full value of their properties by the issue of additional stock. The Board opposed this move when it was made, and have seen no reason to modify its views. Moreover, investigation has not discovered any such positive advantages in the sliding-scale system of regulation over that still prevailing with respect to the other companies as to justify its substitution. The Board recommend that it is inexpedient to extend the sliding-scale to other gas companies of the Commonwealth.

In conclusion, the Board recommended the passing of "An Act Relating to the Boston Consolidated Gas Company."

Section 1.—Chapter 422 of the Acts of the year 1906 shall become void on the 1st day of July in the year 1917, unless the Boston Consolidated Gas Company shall meantime have satisfied the Board of Gas and Electric Light Commissioners, and said Board shall have certified to the Secretary of the Commonwealth that the trustees of the voluntary asscciation, known as the Massachusetts Gas Companies, no longer own or control, directly or indirectly, a majority of the capital stock of the said Company, and that no other voluntary association, or the trustees thereof under a written instrument or written or oral delaration of trust the beneficial interest under which is divided into transferable certificates of participation or shares, own or control, directly or indirectly, a majority of the capital stock of the Company.

Section 2.—The provisions of sections 1 and 2 of Chapter 422 of the Acts of the year 1906, relative to the standard rate of dividends to be paid by the Boston Consolidated Gas Company, and the increase in the dividends therein authorized, shall not apply to any preferred, special, or employees stock which may hereafter be issued in accordance with the requirements of law relating thereto.

Section 3.—Section 9 of Chapter 422 of the Acts of the year 1906 is hereby amended, so as to read as follows: Section 9. At any time after the expiration of ten years from the 30th day of June, in the year 1906, the Board of Gas and Electric Light Commissioners shall have authority, upon the petition of the Company, or upon the petition of the mayor of any city or the select men of any town in which the Company is supplying gas to consumers, or upon the petition of not less than twenty of the consumers, to lower or raise the standard price per 1000 c.ft. to such extent as may justly be required by reason of greater or less burdens which may be imposed upon the Company, by reason of improved methods in the art of manufacture, by reason of changes in the prices of material and labour, or by reason of changes in other conditions affecting the general cost of the manufacture or distribution of gas. But, after a decision upon such a petition, no other petition shall be brought hereunder within three years thereafter.

Section 4.—This Act shall take effect upon its passage.

COAL SUPPLY IN SCOTLAND.

Regulations by the Coal Controller.

[From a Scottish Correspondent.]

The effect of the new coal supply regulations upon gas-works in Scotland, except for one important area, may be regarded as generally satisfactory. When it is remembered that three of the areas produce, each in themselves, a considerable number as well as variety of good gas coals, it may be taken that the gas-works therein situated will not seriously be affected, and that they are likely to be allowed to continue to use the same class, if perhaps not the actual same coal, as before.

The South-Eastern area (the Border district), embraces Galashiels, Hawick, and the Granton works of the Edinburgh and Leith Gas Corporation. These works will draw upon the Lothian coalfields, as at present; and it is understood that gas-works in this area draw only very slightly from Fifeshire and Lanarkshire. To them, therefore, the new regulations do not present any serious interference. The South-Western area, which includes Largs, Kilmarnock, Ayr, Dumfries, &c., will draw their supplies from the Ayrshire coalfields, as they do at present to a very large extent; any coal drawn from Lanarkshire in the past being a comparatively small amount.

The North-Western area [No. 18] comprises by far the maximum number of gas-works in Scotland. They are also the larger in point of size, and include Glasgow, Paisley, Coatbridge, Hamilton, Motherwell, and a number of other fairly considerable works. These works are fortunate in being situated in the midst of the best gas coal producing area in Scotland, from which they have hitherto been in the habit of drawing their entire supplies. It is true the Glasgow Corporation have during several recent years drawn upon Fife, but chiefly perhaps in order to maintain supplies; and it is understood that the contracts recently fixed have placed the whole requirements from Lanarkshire. Paisley takes about one-third of its requirements from Ayrshire; and to this extent it will be affected.

The North-Eastern area is undoubtedly the district which presents the greatest difficulty and objection to the regulations of the Coal Controller from the point of view of the gas manager. This area embraces all the gas-works immediately north of the Forth, and it is laid down that these works are to be provided with gas and coking coal from their own area, which is the Fife coalfield. It is well known that Fife coals are poor for gas-works purposes; and from actual experience the writer is able to state that coals from this area yield from 1000 to 1500 c.ft. less gas per ton, only about 18 to 22 lbs. of sulphate of ammonia, less tar, and a coke that is distinctly inferior. With only three exceptions known to the writer, Fife coals have never been attractive for gas-works use. This is due largely to the fact that they belong to the non-coking class. It can be shown that if gas-works are required to draw from Fife, and to take Aberdeen and Dundee as examples, that the extra quantity of coal to be conveyed in wagons on the railways will amount to about 15 p.ct. This extra quantity is considerable when it is remembered that Aberdeen and Dundee each consume about 120,000 tons of coal annually, and that the aggregate requirements of all the other gas-works in the same area exceed this amount. Evidence of the non-suitability of Fife coals for gas-works purposes is found in the fact that

hitherto coal from this area has gone very largely for shipment. Gas-works have taken only the minimum quantity of Fife coal; and the writer learns that, in the case of quite a number of works, no coal from Fife has been used for many years. The Dundee and Aberdeen Gas-Works, as the largest users north of the Forth, have taken only about 5 p.ct. of their total requirements. This is entirely due to the non-suitability of Fife coals for gas making, notwithstanding its nearer proximity. It has been remarked that Fife coals are non-coking; and in the case of three large works where stoking machinery is in operation, it would be an absolute impossibility to use Fife coal having regard to the difficulty of pushing out the coke. Where coke-pushers are in operation, it is necessary to use at least a large proportion of coking coal, and it is not practicable to employ the machines successfully with the poorer quality of coke from Fife coals.

At the Perth Gas-Works all the retorts are horizontal, machine charged and discharged. Perth will require to be served with a large proportion of good coking coals; and these are not obtainable to a sufficient extent in the area defined by the Controller as the source of coal for Perth. The Stirling Gas-Works are peculiarly situated, as hitherto they have drawn their supplies from Bannockburn, only a few miles away; while according to regulations, supplies must now come from Fife—a much greater distance. A machine pusher is in use at Stirling; and here also coking coals must largely be used. It cannot be too largely emphasized that Fife coals are generally useless where stoking machinery is in use, because of the small coke produced—sometimes largely made up of breeze, thus leading to danger of bursting the retorts with the pusher. It is evident the cases of Perth and Stirling—and there may be others elsewhere—call for exemption to some extent.

The Coal Controller is prepared to give preference to coke-ovens, gas-producers, and automatic stokers, when certain special descriptions and qualities of coal are required for certain purposes. It is hoped that the necessary diversion of supplies of coal will be made to gas-works north of the Forth. In this regard the Coal Controller will, it is hoped, give due weight to the fact that gas-works are themselves the means of saving tonnage over the railways, having regard to the fact that half the weight of coal used in gas-works is sold in the form of coke to consumers of fuel locally. Further, the extent to which gas is employed for household requirements and for munitions and manufacturing purposes, means a great saving in the use of solid fuel, and, therefore, saving of carriage on the railways.

Mr. Bamford, from the Coal Controller's Department, London, along with Mr. Thomas Glover, met in Glasgow last Wednesday a number of managers of gas-works most affected by the new regulations. These gentlemen also met the Council of the North British Association in the afternoon. The whole position was fully gone into and carefully reviewed; and it is learned that, in those cases where there is distinct and strong evidence of the unsuitability of coals for particular gas-works, sanction is likely to be given to draw upon the restricted areas for at least a percentage of the total requirements. The London representative was strongly impressed with the evidence laid before him.

The District Coal and Coke Supplies Committee should have at least one representative from the gas industry in Scotland whose local knowledge of the coal suitable for gas making from the several areas, as well as his knowledge of the particular requirements of gas-works (these are strikingly exceptional in a few instances) would be a matter of simple justice. At present, the Committee in Glasgow is composed entirely of coalowners, who do not presume to know much of the needs of gas-works as an individual industry for particular qualities of coal. The need for such a representative is seen in the fact that north of the Forth the two largest consumers of coal are Dundee and Aberdeen Gas-Works, and that of necessity, both these works for almost all time in the past have derived their major supply of coal from the Lothians and Lanarkshire; and that Fife, while much nearer, has been almost entirely neglected as a source of coal supply.

The Coal Controller, it is evident, has not been served with sufficient data of an accurate and reliable kind as regards the quality of coal used in the gas industry—at least, as regards the quantity and quality of Fife coals suitable for gas-works north of the Forth. It was strongly asserted to the Controller's representative and Mr. Glover that the quantity of gas coal in Fife is far short of that needed for the area defined, and that grave miscalculation had been made in assuming that the North-Eastern area could find all its gas coal in Fife. The representative stated to the meeting that Mr. Calthrop had already taken steps to appoint an outside member (who would be neutral) to the District Coal and Coke Supplies Committee. The opinion was strongly expressed that this was not sufficient. Experience had shown that the coalowners who formed this Committee, as sellers of coal, could not be expected to deal satisfactorily with supplies, and that the users of coal should be represented. The representative stated that he would put these views strongly before Mr. Calthrop. Mr. Glover said that he was anxious to co-opt for his own assistance a Scottish gas engineer to advise him as to the particular position of gas-works supplies of coal in Scotland. This appointment will be welcomed.

A contribution of ten guineas has been voted by the Institution of Gas Engineers to the Board of Scientific Societies, of which the Institution is a "constituent society."

ELECTRICITY SUPPLY MEMORANDA.

A SENSIBLE article (with one or two side-issue exceptions) which invites the electrical industry, the Board of Trade Electric Power Supply Committee, and all others concerned, to pause and to broaden their investigation of electrical affairs, appears under the title of "Pipe Lines *v.* Pole Lines" in the "Electrical Times." The author signs himself "D.V.M." The inquiry into the cheapening of electric power supply threatens to narrow itself down, through the steering power of the electrical enthusiasts on the Departmental Committee, to large generating plant concentrations, with existing interests in opposition, all struggling to defend their own particular allotments in the electrical field. The position that "D.V.M." takes, "Meteor" (with wisdom reigning) puts crisply: "If we are right in laying down a small number of super-stations, let the work go ahead by all means. But first let us be absolutely sure that there is no considerable risk of the whole system becoming obsolete as the present one has done." In the electrical world, it is generally thought that the electrical engineer is his own best specialist; but "D.V.M." frankly confesses that he is not averse to letting the non-electrical engineer have his say. The electrical engineer is not omniscient any more than other engineers; but, as we have before said, when a revolution in practice is contemplated, it is just as well to assure oneself that the lines that it is proposed to take are the right ones, and the ones that will contribute the maximum to national economy. "It is essential," remarks "D.V.M.," that the non-electrical engineer should have his say, "if only for the ultimate benefit of the electric supply industry, since any rashness born of undue enthusiasm in electrical transmission would undoubtedly lead to a set-back." Unusual electrical prudence is shown here.

External Advice.

"D.V.M." lets a bomb drop in electrical circles. Suppose an engineer could show that capital and running charges were less on a line of pipes conveying fuel than on a line of cables conveying electrical energy. The supposition is heretical; put into print, it is worse. But he salves the wound. Of course, the lower charges of the pipe-line would not demolish the electrical paradise, "since all light, power, and heat should be conveyed to the consumer electrically in any case; coal or gas burning on private premises being dangerous and unsanitary." The proposition and allegation are both dressed in a diaphanous garb of falsity, which does not really deceive even the central station engineer, who wishes devoutly there was more solid truth about it. The writer proceeds to soundly rate those electrical engineers who assume that, in all cases and conditions, electricity is necessarily, and beyond question, a proper medium for long-distance transport. At the pit mouth there is no certainty of finding water for condensing purposes. It might be possible to transmit coal to the nearest river; there construct the generating plant; and thence transmit the electrical energy. But that is not the same thing as producing and sending the current direct from the source of fuel supply. He thinks of pipe-lines; and the very fineness of the subdivision of coal to-day "gives furiously to think." There is something here staring the electrical engineer in the face. We take it "D.V.M." has visions of coal dust conveyance by air pressure; and in our minds we conceive some ugly blockings and intermittent supplies. It may also give him "furiously to think" when he is reminded that the reduction of coal to dust for storage purposes brings it into a condition conducive to more expeditious oxidation—so promoting with greater rapidity the conditions necessary for spontaneous combustion. Gas, he imagines, "might demand too big an outlay in pipes. But much depends on the degree of compression possible." He should study the linear characteristics of American pipe-lines for natural gas, their carrying capacities, and the pressures used. At best, the electrical superstation would only put on to the wires a small percentage—our friend says 20, but we would halve the figure under exceptionally good circumstances—of the original thermal value of the coal; and there are the subsequent transforming and transmission losses. The prospect does not look inviting regarded from the platform of economy. There may be more in the pipe-line yet than the pole-line. It may even be that it will be cheaper to carry the concentrated riches of coal as now, and have its different products divided-up at the localities where they are wanted. Otherwise, there will have to be distribution systems radiating from the pit heads all over the country for electricity, for gas, for coke, for tar (crude and refined), for the light oils, for sulphate of ammonia, and all else. There may yet be a proved economy in the railway coal wagon over concentrations which, like the Zeppelins, make good targets, and which would mean huge expense in distribution and in the provision of plant and cables in excess of requirement in order to ensure continuity of supply. It is no limited inquiry that should take place by the Departmental Committee now sitting at the Board of Trade.

Pipe-Lines v. Pole-Lines.

The Electric Power Supply Committee of the Board of Trade must acknowledge that in the electricity supply industry it is the best hated of all institutions. But the funny part of the matter is that, instead of the industry

The Ruling Discontent.

compelling the Board of Trade to dissolve the Committee, and (if one is really wanted) set up another of approved composition, by declining to give evidence before this one, the various organizations are preening their feathers and preparing to make the best possible show before the Committee, knowing all the time that confidence in any real good coming out of it is at a very low level. The agitation for additional representatives of municipal undertakings resulted, as mentioned last week, in the appointment of Mr. Harold Dickinson, the Electrical Engineer of Liverpool, Bailie Smith, of Glasgow, and Mr. Vesey Knox, K.C. The two latter appointments have only irritated the recalcitrants. The "Electrical Times" thinks that politics and string-pulling are now at their crisis; and that there may be more news to record shortly. "Electrical Industries" submits that "the Board of Trade must realize that nobody has any confidence in the present Committee. . . . The best thing to do is to scrap it, and replace it by a body of leading industrialists who have no concern with vested interests." To the "Electrician" it seems a mistake to add to the Committee further members having mainly the qualifications of City Councillors or King's Counsel, however eminent, when there are available many municipal engineers of great experience. So the tide of discontent and suspicion flows over this ill-favoured creation of the Board of Trade.

Not the Way to Coal Economy.

The Coal Controller is either a diplomatic man or he is fond of a little joke. When addressing the Incorporated Municipal Electrical Association recently, although he told the members that he was not a technical man other than in railway matters, he said he believed electrical undertakings represented the most efficient coal users in the country. That was the same meeting at which the members were debating how they could relieve themselves of the obloquy of being among the most prodigal of coal users; and consequently there was justification in the editorial remark in the "JOURNAL" for July 3 [p. 12] that "the electrical engineers present must have been mightily tickled over this, as there flashed across their minds the data as to the amount of thermal value that goes into their boiler furnaces, and the resultant exiguous thermal value that is available at the consumers' terminals." Since then the Coal Controller has issued a number of suggestions [*ante*, p. 75] which represent the advice tendered to him whereby "economy in the use of coal can be effected and much inconvenience avoided" in the matter of coal supply "during the next and succeeding winters." There are only a couple of criticisms to be made. The first refers to the suggestion "that the various factory owners throughout the country who at present generate their own power by means of coal, should make arrangements for taking their power requirements from an outside source in districts where the power supplies have a margin available." This altogether depends on the circumstances of the locality. For instance, it is calculated that the average consumption of coal per unit by town electricity supply stations in this country is approximately 4½ lbs., which means 3·375 lbs. per horse-power-hour. Some stations run up to several pounds' coal consumption per unit generated; there are very few that are much below 3 lbs. per unit. Transfer from private power plants to a public supply to effect coal economy depends in the case of electricity, first, upon the consumption of the generating stations; and, secondly, upon the fuel used by the private owner of plant. It may be fuel from the local gas-works, which utilizes a ton of coal with a thermal efficiency unapproached by any other users. The second suggestion for criticism is "the installation of gas or electric cooking and heating appliances in public and private buildings, with a view to saving coal generally." Now, whoever advised the Coal Controller regarding the substitution of electricity for coal in order to effect economy of the latter ought to be put under thorough examination in his presence. We will suggest a line. Suppose the coal used has a calorific value of 14,500 B.Th.U. per lb., this would mean for the average consumption of 4½ lbs. of coal per unit of electricity generated 65,250 B.Th.U. Assume the coal grate has only 20 p.ct. efficiency, this would mean that, if the 4½ lbs. of coal were utilized in the coal grate, there would be delivered into the room 13,050 B.Th.U. Let us further suppose that the electric heating appliances used have 100 p.ct. efficiency, which they have not, and that the whole 3420 B.Th.U. were delivered into the room, the consumer stands to lose nearly 10,000 B.Th.U. by transferring from coal to electric heating. To get the equivalent 13,050 B.Th.U. delivered into his room through the medium of electricity, he would have to use nearly 4 units of electricity (still assuming 100 p.ct. efficiency for the electric appliances), which, on the average of 4½ lbs. consumption per unit at the central station, would mean nearly 18 lbs. of coal consumed there, against 4½ lbs. in the coal grate. There is something here which should interest the Coal Controller.

Limitations of the Electric Furnace.

It is the opinion of Mr. C. F. Hirshfeld, Chief of the Research Department of the Detroit Edison Company, that in a general sense, the electric-furnace cannot be considered as a commercial competitor of furnaces heated by combustion. The use of the electric-furnace must make possible the attainment of something unattainable by combustion methods, or else there is no possibility of its being used in place of the older type, excepting perhaps under very unusual conditions as to the relative costs of fuel and electrical energy. This expression of opinion is found in a paper before the American Electro-Chemical Society. But there is the qualifying statement that there are certain low-temperature processes—below about 290° C. (554° Fahr.)—which, under certain circumstances, can be conducted to better commercial advantage by means of electric heating than was possible by means of combustion heating. Such low temperatures are common in numerous baking and drying operations. During recent years, the use of electric heating where low temperatures are required, has been adopted in cases calling for the installation of equipments with capacities ranging from several hundred to several thousand kilowatts. Mr. Hirshfeld instances japanning work; and the makers of gas-furnaces for this purpose should consider his submissions. Photomicrographs, he says, show that, in baking japan slowly in a direct-fired gas-oven, small craters were formed, which "seem to be typical of all baking methods in which the heating is done by means of hot gases bathing the work." On the other hand, work done in the electric-furnace shows smaller and more evenly distributed craters. A saving of time is also claimed for the electric-furnace—the baking of three coats in a gas-oven taking five-and-a-half hours, against two hours and forty minutes in an electric-oven. Mr. Hirshfeld believes that for this work radiant energy is preferable to convected heat, in that it causes a more rapid setting of the inner portion of the coat. Experiments satisfy him that samples baked by convected heat had the poorest surfaces, while those baked by internal heating have the highest gloss and most perfect surfaces. With internal heating, a maximum metal temperature of the order of 170° C. (338° Fahr.) and a bake of fifteen minutes were found capable of giving better results than could be obtained with internal electric heating. *Primâ facie* internal heating seems the correct method in order to get the base of the coating to set first; but if radiant heating has the same effect, why not the surface combustion gas method? In this connection, reminder may be given of the comparisons made—also at Detroit—of gas and electric japanning ovens, as referred to in the "JOURNAL" for Dec. 26 last [p. 639]. It was then stated that, "under the most favourable conditions, the operating cost of an electric-oven is at least twice that of gas in any place in Detroit, and, under less favourable conditions, the cost may be four or five times that of gas per bake."

INSTITUTION OF GAS ENGINEERS.

Council Meeting.

A Meeting of the Council of the Institution of Gas Engineers was held on the 5th inst.—the President (the Right Hon. Lord Moulton, K.C.B., F.R.S.) in the chair.

Among other business transacted, Mr. Broadberry reported an interview he had had (as representative of the Institution) with representatives of the Institution of Heating and Ventilating Engineers on the subject of the unification of symbols and abbreviations used in the science and practice of heating and ventilation. While it was felt that the present time is not suitable for coming to any decision on so important a matter, it was agreed —provided the proposals are unanimously approved by other technical bodies—that the term "therm" should be adopted in place of B.Th.U. (British thermal unit) so as to distinguish it from the Board of Trade unit, and that the symbol ℏ should be employed to denote it. [See next page.]

The preliminary arrangements made by the Gas Components Committee for their research were reported. It was announced that offers of assistance in the research had been received from the South Suburban Gas Company and the Gas Department of the Birmingham Corporation.

Correspondence between the Institution and the Board of Trade with reference to the operation of water-gas plant was considered; and it was decided to issue a statement on the subject. [A copy of the statement appeared last week, p. 61.]

In response to a suggestion from the National Gas Council, representatives of the Institution were appointed to attend a conference to discuss the question of a proposed building.

A report was presented from the Chairman of the Demobilization Committee (Mr. R. G. Shadbolt), indicating the arrangements that had been made for dealing with any cases that may be brought under their notice.

A communication was received from the Wales and Monmouthshire District Institution suggesting the consideration of the subject of linking-up gas undertakings in a manner similar to that proposed by the electrical industry. The Council were informed that this matter is now receiving the attention of a Committee of the National Gas Council, who would in due course present a report upon it.

There will be no British Association meeting this year—that provisionally arranged for Bournemouth having been cancelled after consulting the Bournemouth authorities and His Majesty's Government. This will be the first time since 1831 that the Association has not been able to assemble. Sir Arthur Evans, the President of last year's Newcastle meeting, will remain in office, and Sir Charles Parsons will preside over the meeting to be held at Cardiff in 1918—at a date not yet fixed. The Bournemouth authorities have expressed the wish soon to entertain the Association; and the invitation has been accepted for 1919.

CARBONIZING RESULTS WITH GLOVER-WEST VERTICAL RETORTS AT MACCLESFIELD.

Make of Over 15,000 C.Ft. by Passing Steam through the Charges.

The annual returns of the Macclesfield Corporation Gas-Works for the year ended March 31 last have aroused interest among gas engineers who are endeavouring to obtain increased efficiency from their carbonizing plants owing to the present high price and scarcity of coal and oil and increased labour costs. In response to the request of several engineers and a representative of the "Journal," Mr. J. E. Blundell, the Corporation Gas Engineer, has kindly furnished particulars of the methods he has employed to obtain and maintain a further efficiency above the average of the results published in the last annual returns, which showed that the production per ton of coal was 12,930 c.ft. of gas of a calorific value of 533 B.Th.U. gross, with a yield of 12·7 gallons of tar, and 30·7 gallons of 10-oz. ammoniacal liquor.

The carbonizing plant at the Macclesfield Gas-Works consists of a Glover-West vertical retort plant of a nominal capacity of 1 million c.ft. per twenty-four hours, but capable of producing, by the methods now employed, an increase of at least 25 p.ct. by the manufacture *in situ* of a small quantity of water gas by the passing of steam through the charge in the retort. To meet the maximum demand which may arise for a short time during the winter months, there is on the works an independent plant for the manufacture of carburetted water gas, which plant since the beginning of the war has been but rarely used, owing to the shortage and cost of oil.

It was the intention of Mr. Blundell to place at our disposal a very complete set of analyses of the various products from different kinds of coal, with statistics showing rates and temperatures of carbonization, quantities of steam, and quality and quantity of coke made. But, on consideration, he has found that, with some further experiments, he will have sufficient data with which to compile a paper for reading at a meeting of gas engineers, where a discussion on the subject, if it elicited an expression of the experiences of other engineers who have carried out researches in the same direction, would make a valuable contribution to the subject of carbonization. For the present, we are able, by the permission of Mr. Blundell, to publish certain details of the results, with the hope that their publication will at once be useful to those who are searching to increase their output of gas while maintaining its quality, especially the calorific value. As regards the illuminating power, it should be noted that the process of washing the gas by tar to increase the toluol output is in operation at these works. Therefore, although the illuminating power is of an average of 11 to 12 candles (No. 2 "Metropolitan" burner), it would not be just to make comparisons under the existing conditions.

Mr. Blundell has, since the publication of the annual returns, which contain, during the latter period of the year, a larger yield than the average for the year, made further experiments to demonstrate what can be done towards increasing the efficiency of the carbonizing plant; and he submits two examples: In one he realized 15,500 c.ft. of gas per ton of coal, with a calorific value of 510 B.Th.U. gross; in the other, 15,200 c.ft. of gas per ton, with a calorific value of 508 B.Th.U. gross. During the months of April and May this year, the yield of tar was 15·7 gallons, and of 10-oz. ammoniacal liquor 33·35 gallons. These examples are the results of tests made to establish the correct method of applying suitable heat to the retorts—an important point.

In order to reduce the quantity of incombustible matter in the gas, it was necessary to arrange that, in heating the retorts, the highest temperature should be towards the lower end of the carbonizing portion of the retort. To do this the Glover-West system of heating the retorts by separate combustion chambers lends itself admirably to attain the desired temperature. A series of experiments showed that an improper distribution of the heat could easily give a gas with a high content of CO_2, which in properly heated chambers is converted into CO.

Steam is supplied from boilers working at a pressure of 100 lbs. per square inch and reduced to a pressure of from 5 to 10 lbs. in the coke-chambers, to each of which it was admitted through a nozzle of $\frac{1}{8}$ in. bore. The speed of extraction of the coke is reduced by about 10 p.ct.

Experiments have been made with a free space of larger volume than ordinary practice at the upper or outlet end of the retort. These show that an increase of heavy hydrocarbons in the gas is obtained, which indicates that it is possible the production of water gas within the retort may be still further increased without detriment to the calorific value.

The coal used during these experiments was a mixture of Yorkshire, Derbyshire, and Staffordshire coals, with an average volatile matter content of 36·9 p.ct. and ash 5·12 p.ct.

The exhauster, which is of the rotary type, maintains a vacuum at its inlet of 13-10ths to 14-10ths, giving a vacuum of 11-10ths at the outlet of the retort-house governor, which is set to maintain a constant inlet vacuum of about $\frac{1}{4}$-10th. This at the retort outlet would be a level gauge.

Mr. H. E. Riley, of St. Austell, has been appointed a member of the Refractory Materials Committee of the Institution of Gas Engineers.

PROPOSED UNIFICATION OF HEATING SYMBOLS.

As reported in another column, at the last Council meeting of the Institution of Gas Engineers, a suggestion emanating from the Institution of Heating and Ventilating Engineers was tentatively agreed to. This was incorporated in the following table issued by the latter body of symbols and abbreviations, useful in the science and practice of heating and ventilation, recommended by their Standardization Committee and adopted by the Institution at the autumn general meeting in October last year.

Notation	Signification
θ	"Therm." A synonym for the "British Thermal Unit." The Therm may be defined as the amount of heat absorbed by 1 lb. of water for a rise in temperature of 1 degree Fahr., the slight variation at normal temperatures being ignored for practical purposes under this term.
/	"Per." Ex:—5000θ/hr. (5000 therms per hour).
ft^2 or ▱	Square foot.
in^2 or ▫	Square inch.
ft^3 or ⌭	Cubic foot.
in^3 or ⬚	Cubic inch.
°d	Degree difference.
T	Absolute Temperatures. Context indicating which scale.
t	Ordinary Temperatures. Context indicating which scale.
t_1 t_2	Initial and final temperatures.
ρ	Coefficient of friction for flow of fluids through conduits.
ζ	Coefficient of loss of energy in fluid streams due to passing single resistances.

The above table is, of course, supplementary to the symbols, &c., already generally adopted in physics, mathematics, and engineering.

PROBLEM OF DOMESTIC HOT-WATER SUPPLY.

By Thos. Newton.

Many households are once more beginning to experience the drawbacks and the inconvenience of a hot-water system entirely dependent on a coal-fired range. During the cold weather, the waste of coal involved in heating water through the medium of the familiar back boiler of a coal-range somewhat escapes attention. It is only when quantities of hot water are required in warmer weather—without the attendant heat and dirt inseparable from the coal-range—that considerations of cost in terms of coal are ever thought of. Then comes the revelation as to what water heating by this system really costs.

Disadvantages of the Coal-Range Back-Boiler.

The cost of obtaining hot water from a coal-fired range back-boiler in summer—when the initial temperature of the water and other things are in its favour—is obviously excessive. In colder weather the cost is not quite so obvious, but it is none the less very real. It is not quite so obvious, because the coal, which should be legitimately debited to the boiler, unconsciously gets debited to the range. Where the cooking is done by gas, and where, in summer, the coal-range is only utilized for the purpose of obtaining hot water from the back-boiler, the true perspective is at once seen. Instead of getting something for nothing, the process is pretty nearly reversed; and the waste of coal involved is appalling.

Servant Difficulties Surmounted by Using Gas.

The increasing scarcity of domestic servants is now patent to all; and in households dependent on crude fuel the inconvenience falls very heavily. Labour everywhere is at a premium; and anything which will lighten labour's task contributes to the national well-being. The difficulty of obtaining solid fuel for domestic purposes has already been experienced; but it is safe to state that the difficulty will probably be greater, rather than less, in the near future. The waste of man power, too, involved in handling and hauling an endless number of consignments of coal to the hundreds

of thousands of households in our towns and cities is as gigantic as it is unnecessary. Here, then, is ample scope for a communistic experiment along scientific lines; and the requisite organization is already at hand. By an extended use of gas, the waste will be eliminated, and the difficulties surmounted.

An extended use of gas for all conceivable purposes in the household will render the users of it immune from the labour difficulties and inconveniences associated with the use of crude solid fuel. Gas is a reliable and trustworthy servant, ever ready to give clean, silent, and effective service at any hour of the day or night. Moreover, it is under absolute control, and it is entirely dependable. For domestic purposes, it is probably the greatest labour-saving medium of the century.

Water Heating by Gas.

When we turn to the specific problem of heating water by gas —particularly in hot weather—we at once realize that any system that will accomplish this, without at the same time heating any portion of the house, must have superior merits. One of the many defects of the coal-range system of water heating is that, to heat sufficient water for a bath, one must waste a lot of heat upon a mass of cold ironwork, and thus on the room where it is situated —all to no useful purpose. But with water-heating by gas this unnecessary waste of fuel and time is entirely obviated. Gas for water-heating gives quick and efficient service, and at a trifling cost. Where a hot-water pipe system having one or more draw-off taps is already in existence, it is generally better to instal a circulator; but, before doing so, it is desirable to examine the system with a view to improving it. Failure to do this stereotypes the defects which may be inherent in the system, and thus prevents economies in running costs from being effected. Preferably, the hot-storage tank or cylinder should be as close to the circulator as possible, in order to reduce heat losses (which mean gas consumption) due to radiation from the circulating pipes.

In the case of an obsolete tank system, advantage should be taken to reconstruct the pipes, and thus convert it to a modern cylinder system. A system having a secondary return to the hot-storage cylinder facilitates heat losses on account of the circulation of the hot water; and, incidentally, it may be remarked that this circulation of hot water causes heat to be imparted to the room or rooms through which the secondary return passes. This, of course, is objectionable in hot weather. The difficulty may be overcome by fixing a valve on the secondary return pipe just before it enters the cylinder; but this would result in a quantity of cold water having to be drawn off before the hot water became available. The quantity of cold water would be proportionate to the cubical contents of the secondary return. The point to be decided before making this alteration is whether the quantity of cold water would be deemed excessive. The gas consumption will be less with the valve fixed and closed than it would be without the valve. But if the quantity of cold water which would lie in the secondary return makes the fixing of the valve impracticable, the next best thing to do is to lag the secondary return with hair, felt, or some other non-conducting material.

There are several considerations which go to support the fixing of the valve. For example, it may be argued that cold water is necessary to reduce the hot water to bath temperature; hence the only practical difference lies in the fact that the hot water is added to the cold, instead of the cold being added to the hot. Further, where the draw-off tap is fairly constantly used, there is not a sufficient lapse of time to enable the water to become thoroughly cold. An arrangement which can be recommended is one which provides for a double-armed lever and chains being attached to the valve or cock on the secondary return. By simply pulling a chain, the hot water can be circulated or not, as desired. It should be borne in mind that heat losses are appreciably reduced by lagging the cylinder and pipes with some non-conducting material; and this is a point of great importance when it is considered that to reduce heat losses is to make water-heating by gas more economical, and therefore more popular. Some consumers are converted to the use of gas for water-heating when it is pointed out to them that the system can be arranged to work either independently or in conjunction with the coal-range. It is always advisable, however, to connect the flow-and-return pipes of the circulator direct to the cylinder, instead of connecting them to the flow-and-return pipes between the coal-range back-boiler and the cylinder. As a matter of fact, the latter should only be done as a last resort.

In the absence of a system of hot-water pipes, the usual practice is to instal a combined hot-water storage cylinder or tank with a gas-heated boiler, and then to run the hot-water supplies direct from the hot-storage cylinder to wherever they may be required. This arrangement possesses many advantages. The boiler is close up to its work; and consequently heat losses between the burner and the hot-storage are reduced to a minimum.

Whatever kind of apparatus may be decided on for a given set of requirements, it is essential that the burner should be thermostatically controlled; otherwise full advantages of water-heating by gas cannot be obtained. However, given such thermostatic control, the cost of gas-heated water averages approximately 1 foot of gas per gallon of water heated from normally cold to bath temperature. This applies to a highly efficient system; but an average of 1¼ ft. of gas per gallon of water raised from cold to bath temperature would apply generally. It will thus be seen that the cost of gas for heating (say) 25 gallons of water for a bath ranges from 1d. with gas at 2s. 9d. per 1000 c.ft., to 1¼d. with gas at 3s. 6d. Of course, the water may be obtained at a greater temperature than bath temperature, at an expenditure of an amount of gas proportionate to the extra number of degrees through which the water is required to be raised.

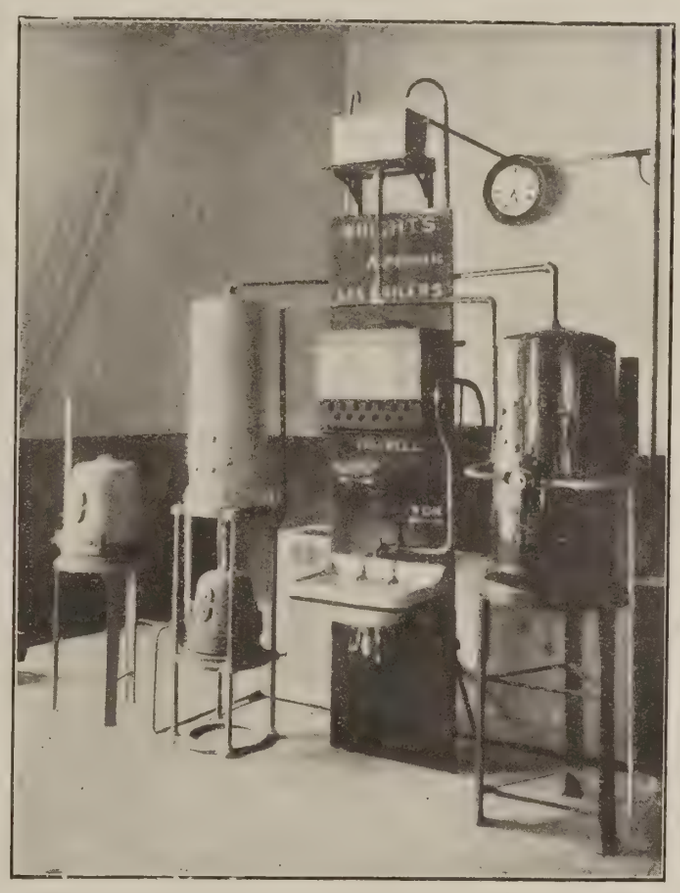
The foregoing methods of dealing with the domestic hot-water supply are intended to apply to those cases where more than one draw-off tap is in use. Where a supply of hot water is required at only one point, a geyser fixed at that point would answer the purpose admirably, and would give similarly satisfactory and economical results.

Finally, a word of warning may perhaps be allowed in connection with the gas supply. There is too much of a tendency to cripple the supply of gas to the various types of gas apparatus now in common use. This is a fatal policy, both for the undertaking and for the consumer. The best, quickest, and most economical results are always obtained when the gas supply is not only adequate, but ample.

GAS-HEATED WATER HEATERS.

A Show-Room Outfit in Dublin.

The accompanying photograph shows a combined demonstration outfit in connection with gas-heated water heaters, which will be found both novel and of exceptional interest. The apparatus has been photographed as installed in the hot-water show-room of the Alliance and Dublin Gas Consumers' Company. As will be seen, it consists of three distinct appliances—the "Sun" boiler on the right of the photograph; the "Hotwell" in the centre; and the "B.T.U." on the left-hand side. This latter is arranged in the form of a builder's set—*i.e.*, with the storage cylinder mounted above the boiler.



The unique feature of the arrangement is that all three parts of the plant are connected-up to the lavatory basin and the cold-water cistern shown in the photograph; the arrangement of the connections being such that the show-room attendant can demonstrate separately the use and the respective advantages of each type of boiler, as applied to domestic hot-water supply. The lay-out also illustrates the automatic regulation of the gas supply to the boilers by means of the thermostat fitted to each.

The demonstration outfit shown was installed by Messrs. John Wright & Co., of Birmingham, who are the manufacturers of the three water-heating specialities shown.

A Committee has been appointed in Dublin—consisting of members of the Institution of Electrical Engineers, the Institution of Civil Engineers of Ireland, and the Engineering and Scientific Association of Ireland—to investigate and report upon the utilization of the peat deposits of Ireland.

EFFUSION METHOD OF DETERMINING GAS DENSITY.

Some Official Experiments.

A preliminary report of some extensive investigations on the bunsen effusion method is contributed to the American "Gas Age" by Mr. J. D. Edwards, by permission of the United States Bureau of Standards. Lack of agreement among users of it in practice led to controversy, especially in regard to large quantities of natural gas bought and sold; and by request of certain gas companies, the Bureau sought to discover sources of error, and develop the lines on which the best results can be secured.

In a preliminary series of tests, designed to indicate the accuracy of the method as applied by experienced observers under field conditions, using orifices of varying sizes, sometimes fairly reliable results are obtained; but under other conditions, important errors occur. Operating on a natural gas, specific gravity ·752, and a commencing pressure of 8 in. of water, falling to 1·5 in. or 2 in. at the conclusion, seven tests with orifice No. 13 gave results ranging from 0·704 to 0·648; seven tests with orifice No. 4 gave slightly higher figures, varying from 0·756 to 0·768; two with orifice No. 1 were still nearer the correct figure; and orifice No. 11 averaged 4 p.ct. low. Five tests on a gas of ·650 gave results within limits of 3·5 p.ct. low, and 1·1 p.ct. high. No consistent improvement was obtainable by varying the details of operation, nor was any satisfactory explanation forthcoming as to the discrepancies. The theory that the time occupied by effusion of equal volumes is directly proportional to the square root of the density, assumes that the process is isothermal, that there is no loss of energy by friction, and no difference between the physical properties of the gases compared, but is one of stream-line flow affected by these and possibly many other considerations.

Samples of gases comprising natural gas (3), and argon, carbon dioxide, hydrogen, and methane (1 each), were stored in steel cylinders, and their specific gravities accurately determined by direct weighing. Both displacement and expansion apparatus in various forms were used, with refinements such as automatic electric timing devices [see fig. 1] for use with mercury. Details as to

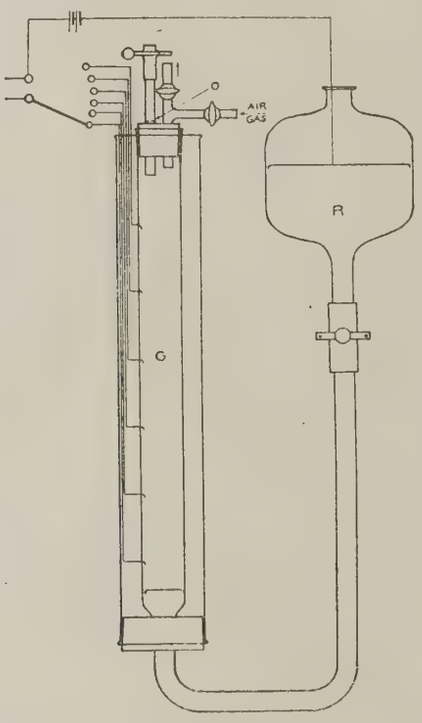


Fig. 1—Automatic Timing Effusion Apparatus.

the preparation of plates and orifices are given. Platinum-iridium (85 : 15) was found to be the most suitable material. The perforated plates were sealed between two short lengths of glass tube, mounted with cement in metal case tubes with threaded ends, marked A and B on each side of the plate respectively, so that the effect of reversing the direction of flow could be studied. A series of observations under average pressures ranging from 8 to 240 mm. of mercury, using the same orifice (28-B) throughout, on the four pure gases, yielded curves of characteristic form for each gas [fig. 2] but widely differing one from the other, and indicated that, while acertain pressure limit might show correct density for a given gas with a given orifice, there was no effusion pressure at which one orifice would give correct results with any gas; and that the necessary corrections were too complicated to admit of use in the form of tables. Also, that they were more marked at pressures below 40 mm. A low pressure must therefore be avoided; but it must not be assumed that the higher the effusion pressure the more satisfactory the result.

In enumerating the respective advantages and disadvantages of

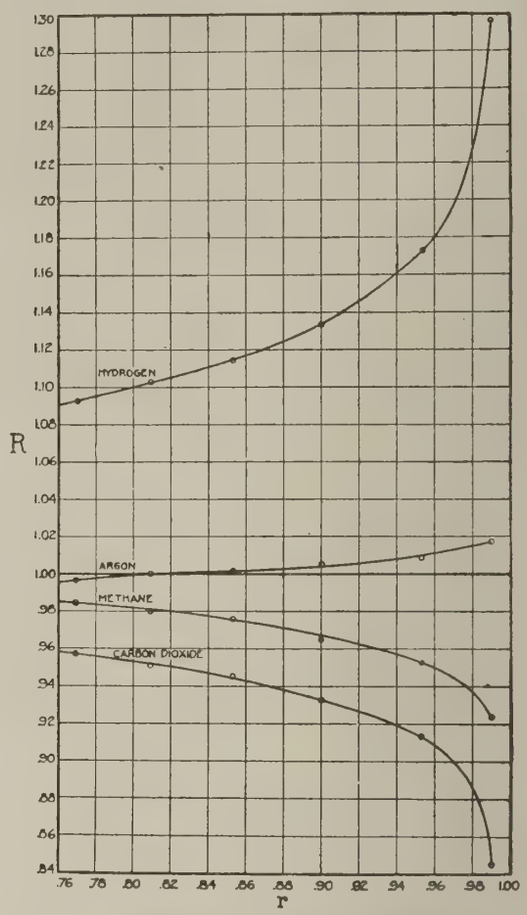


Fig. 2—Apparent Specific Gravity with Orifice 28 B.

using water or mercury as the confining medium, it is stated that the expansion of the gas in passing the orifice may lower the temperature to a degree sufficient to cause water condensation that would partly block the aperture, and lead to discordant results. Mercury is preferable for this reason; but its use is difficult when low effusion pressures are required. The shape and thickness, as well as the effect of burs or other irregularities, are also considered. A hole punched from *a* to *b* [see fig. 5] gave higher results when the flow of gas was in the same direction than when it was reversed; and the higher results were usually the more accurate. With any one gas, the curves at different pressures with different orifices were parallel—see fig. 3; and of 34 tests with methane (density = ·583), with orifices 0·07 to 0·37 mm. diameter and 0·02 to 0·10 mm. thick, 28 gave results so nearly accurate as to come within the range of experimental error. At 65 mm. pressure, 15 tests agreed within 1·5 p.ct. + or −; but with a pressure of 8 mm. the results were found to be more variable, though satisfactory figures were obtained, with certain dimensions.

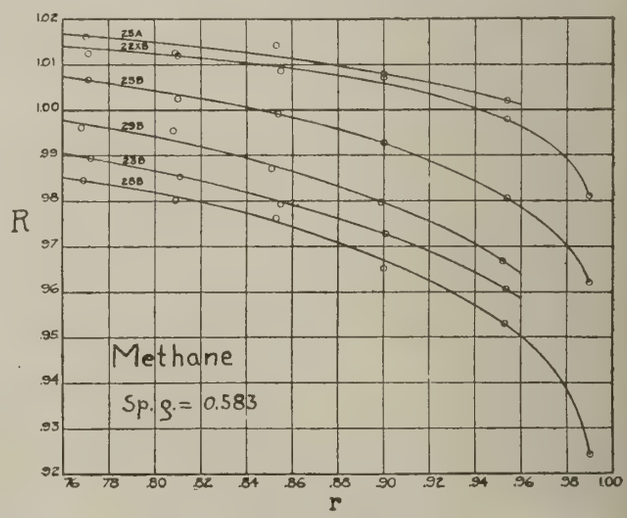


Fig. 3—Effect of Various Orifices.

The principal advantage of the expansion as compared with the displacement apparatus is the small quantity of confining medium needed, which is important when using mercury. But a working period sufficient to ensure close timing is essential to accurate results; and to give equal times the expansion vessel must be eleven times larger than the displacement vessel, with conditions the same. Reducing the size of the orifice, or increasing the effusion pressure, is only advisable within certain limits; so the displacement type is preferred for general use. In expansion apparatus, the water jacketed gas-container may be either cylindrical

or spherical, 150 to 200 c.c. capacity, and having a smaller container immediately below, so that a sufficient supply can be drawn at one operation to allow for the loss of bulk on compression. The pressure is supplied by a reservoir that can be adjusted at a suitable height, and a strong flexible tube connection. The same apparatus can be used either with water or mercury; and in the first case the finishing pressure should be less than 5 cm. With mercury, the test should start with 15 to 20 cm., and conclude with 1 to 2 cm. pressure. Constrictions in the connecting tubes do not affect the results, unless unduly long or small; so the tubes carrying the observation marks may be fairly small in diameter, to ensure close reading and timing.

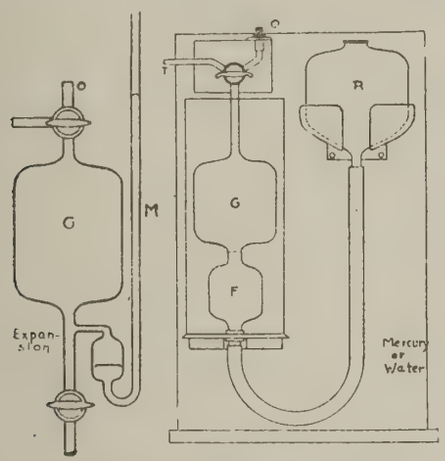


Fig. 4—Expansion Mercury or Water Types.

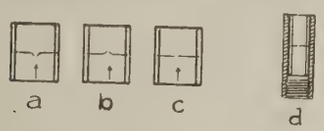


Fig. 5—Forms of Orifices (d is the Recommended Form).

For a mean effusion pressure of 95 mm., using mercury, an orifice 0·15 to 0·30 mm. in a plate not exceeding 0·05 mm. in thickness is advised; and for water and 8 mm. pressure, the size of the orifice should be 0·18 to 0·30 mm., and the plate not more than 0·04 mm. thick. With careful standardization, and correcting factors under some circumstances, the effusion method applied to gases of similar general nature is capable of giving results that are correct within a margin of 2 p.ct. With the usual laboratory precautions when dealing with gases, three or four consecutive tests of gas and air alternately should agree within 0·5 p.ct. An error in timing is doubled on the result, so an accurate stop-watch, occasionally standardized, is essential.

MIDLAND JUNIOR GAS ASSOCIATION.

Annual General Meeting.

The Tenth Annual General Meeting of the Association was held last Thursday evening, in the Reading Room at the Council House, Birmingham—Mr. G. C. Pearson (the President) in the chair.

New Officers.

The President said it was proposed to appoint an Hon. Treasurer; and Mr. T. F. E. Rhead, M.Sc., was proposed by Mr. W. J. Pickering, and seconded by Mr. F. J. Ward. Then Mr. J. H. Hardy had resigned the position of Hon. Auditor; and the Council proposed to ask Mr. W. P. Timbrell (Assistant Accountant to the Birmingham Corporation Gas Department) whether he would accept the office.

It was agreed that this should be done, on the motion of Mr. Ward, seconded by Mr. Pickering.

The President said that, with regard to filling the vacancies on the Council consequent on the retirements under Rule 7, they had had nominations for Mr. W. Batt (Birmingham) and Mr. C. F. Tooby (Birmingham). There were no nominations for the four district members; but it was proposed to ask the four following members if they would accept the position: Mr. C. F. W. Rendle (Redditch), Mr. Ernest Scears (Rugby), Mr. S. J. D. Williams (Stourbridge), and Mr. W. H. Wise (Tipton).

This was agreed to, on the proposition of Mr. T. F. E. Rhead (Birmingham), seconded by Mr. E. H. Wright (Wolverhampton).

An Alteration of Rules.

The President said the next question was an alteration of Rule 7, which had been brought forward by Mr. Rogers: "The ex-President, and two immediate Past-Presidents, of the Association, and the President and Hon. Secretary, for the time being, of the Midland Association of Gas Engineers and Managers, shall be *ex-officio* members of the Council."

Mr. R. Gr. Marsh (Birmingham), moving this alteration, said it would greatly assist the Council in their deliberations.

Mr. Wright seconded; and it was agreed to.

Members from Teaching Staffs.

The President said at the Joint Council meeting it was proposed that members of university staffs should be admitted as ordinary members of the Association—that was to say, whether or not they had anything to do with gas manufacture. It was the feeling of the Joint Council that it would be a great advantage to the different Junior Associations to have these new members; but it was necessary for this decision of the Council to be ratified by the meeting.

Mr. Rhead proposed this, thinking it would be a good thing if the university people and those on the works understood each other better.

Mr. V. E. Green (Birmingham) suggested that members of the teaching staffs of technical schools might also be admitted on the same basis.

The President, in reply to a question, said that, if the alteration was extended in this way, it might mean perhaps a dozen new members. The interchange of views would be to the advantage of all; and Mr. Green's suggestion was a very good one. Of course, the idea was merely that these gentlemen should be eligible to become members of the Association if they wished. What was agreed at the Joint Council meeting was that the Junior Associations should open their membership to university staffs; so that if they included technical school staffs, they would have gone further than the other Associations.

Mr. Rhead approved of this addition, and expressed his willingness to second Mr. Green's suggestion.

Mr. E. W. Smith (Birmingham) strongly supported the idea that they should admit those of the technical school staffs, as well as the university staffs, who might apply to be made members. Personally, he would have preferred to confine it to the scientific staffs. Though it was not likely any others would care to come in, such a stipulation would indicate more clearly what they were driving at. They wanted to bring about a closer connection between science and their industry. He would propose that members of the scientific university and technical school staffs should be eligible.

Mr. Green seconded this, and it was carried.

The New President.

The President said that in the ordinary course of things Mr. B. Skidmore, of Smethwick, should have been President; but early in the session he tendered his resignation. At the time, he was persuaded to withdraw it; but since then pressure of work had compelled him to resign again. The Council felt bound to accept this; so that Mr. R. G. Marsh (Birmingham), who was Junior Vice-President, automatically became Senior Vice-President, and had consented to fill the office of President for next year, throwing open the positions of Senior and Junior Vice-Presidents. The Council had elected Mr. Poulson (Stafford) Senior Vice-President and Mr. C. C. Barber (Saltley) Junior Vice-President.

Evening Meetings.

The President referred to the experiment that had been tried of holding Thursday evening meetings, and said he would like the opinions of those present as to the success of the change. Thursday was fixed upon because it was the day on which members of the Senior Association met in Birmingham; and it was felt that they would be thus more likely to get seniors sometimes at their meetings.

Some discussion followed, in the course of which Mr. Rhead moved that the meetings be held on Thursday evenings, but, if possible, so as not to clash with those of the Society of Chemical Industry. Mr. Wright proposed an amendment in favour of Saturday afternoon; and Mr. A. Kendrick (Birmingham) of Thursday and Saturday alternately.

The amendments were negatived, and the continuation of evening meetings decided upon.

The President, in view of the difference of opinion that had been manifested, proposed that the whole of the members should be circularized, so as to ascertain the general feeling upon the subject. The matter could then be dealt with again early next session.

Mr. Marsh seconded; but the suggestion was not agreed to by the meeting.

The Report and Balance-Sheet.

The Hon. Secretary then read the report for the three sessions 1914-15, 1915-16, 1916-17, which the Council began by congratulating the members on having carried through the work of the three sessions in a highly satisfactory manner, having regard to the many difficulties experienced by reason of the war and absence of many members on actual war service. The number of ordinary members now on the books is 176, of whom at least 38 are away serving with the Colours. Unfortunately, several have been called upon to make the supreme sacrifice in the service of their country. So far as is known with certainty, the following members have been killed at the various fronts or on war duties, and their names are entered on the following

Roll of Honour.

H. H. Billingsley, Birmingham.	Stewart Smith, Coventry.
E. W. Blenkinsop, Warwick.	W. T. Treppass, Leamington.
B. F. Parsons, Birmingham.	B. Whitecombe, Birmingham.
Tom Rudge, Stafford.	A. E. Whittingham, Birmingham.

In addition, the Association have lost two valuable members in

Mr. T. Brooke, late of Nechells, and a member of the Council, who was obliged to relinquish his duties at Birmingham owing to ill-health, and has now definitely severed his connection with the Birmingham Gas Department; and Mr. W. S. Smart, who resigned his membership of the Association on taking up the position of Manager to Messrs. Jenkins & Co., Ltd., of Retford, and rejoined last year on taking up his duties again as Chief Draughtsman to the Birmingham Gas Department, and who died in May last. There has been added to the list of honorary members the name of Mr. E. B. Tomlinson, Engineer at the Nechells works. After expressing the Association's indebtedness to Mr. F. J. Ward, the President for the 1914-15 session, and to the present President, Mr. G. C. Pearson, the Council went on to state that the past session has been, taking all things into consideration, a highly successful one, and that the Association are entitled to consider the position a satisfactory one, having regard to the conditions prevailing at the present time. It was pointed out that the thanks of the Association are due to the Birmingham Municipal Technical School for the use of a room for the meetings during two of the sessions referred to, and that the Association are particularly indebted to the Birmingham Gas Committee for kindly granting permission for the use of the Reading Room at the Council House for meetings during the past session, and to Captain R. S. Hilton for his kind offices in this matter. There were no meetings of the Joint Council until this year, when a meeting was held in Birmingham. The question of education of the junior members of the gas industry brought forward by the President in the course of his inaugural address was fully discussed at this Joint Council meeting, and Mr. Pearson, together with Mr. J. G. Clark, of London, who is the new Hon. Secretary of the Joint Council, were appointed to act in the matter as regards representation to the Institution of Gas Engineers. The question of alteration in the membership rule was also discussed at this meeting, but no alteration was agreed upon.

The balance-sheet showed a balance in hand at June 30 of £8 8s. 9d.

On the proposition of Mr. Rhead, seconded by Mr. L. Sturdy (Birmingham), these documents were adopted.

The "Transactions."

It was next agreed that the course hitherto adopted, of having the Association's "Transactions" prepared in a separate volume, should be abandoned in favour of relying solely upon the volume of "Joint Transactions of the Junior Associations."

The Hon. Secretary, in putting forward the recommendation of the Council to this effect, said that the value of the joint volume would be still greater in the future, if the proceedings of the Scottish Junior Associations were included.

The motion was carried on the proposition of Mr. Wright, seconded by Mr. W. P. Atkins (Birmingham).

The Secretary's Services.

The President said he should like to propose a hearty vote of thanks to Mr. Pickering for the work he had, as Hon. Secretary, done on behalf of the Association. Everything was efficiently carried out, and affairs were kept in a splendid condition by him. The whole of the success of the last session was undoubtedly due to his efforts.

Mr. Marsh seconded the vote, which was supported by Mr. Rhead, and carried by acclamation.

Mr. Pickering acknowledged the compliment, and this brought the formal business to a close.

The members then settled down to an informal debate on the question as to whether gas for lighting purposes will be superseded in the future by electricity. The discussion was opened by Messrs. A. Whitehead and H. W. Dean (Birmingham).

Revision of Price at Drighlington.—The Drighlington Gas Company are notifying consumers that they propose increasing the price of gas 6d. per 1000 c.ft.—from 3s. 6d. to 4s. There will, however, be a revised scale of discount.

Edinburgh Gas Employees' Wages.—At a recent meeting of the employees of the Edinburgh and Leith Gas Commissioners, it was decided that the petition for an increase of 10s. per week should be determined by arbitration; that retort-men could not undertake to do more work, as had been suggested by the Commissioners; and that the increase asked for should apply to the consumers' clerks, gas-fitters, and temporary meter-readers, as well as to the general body of workers. The Salaries and Wages Committee of the Edinburgh Town Council have recommended that the officials of the Corporation should be placed on the same footing as regards a war bonus as the employees who recently received a war bonus of 10s. per week on the pre-war rate of wages.

Kelty Gas Company.—At the annual meeting of the Kelty Gas Company, Ltd. (Fife), the annual statement of accounts was submitted; and in moving its adoption, the Vice-Chairman (Mr. Rowan) congratulated the shareholders on the ever-increasing prosperity of the Company. After allowing £789 for depreciation, there was a balance of £1454. A dividend of 5 p.ct. was declared; and it was agreed to pay off debentures to the extent of £600 during the current year. The gas manufactured was 26,416,000 c.ft., a decrease of 551,000 c.ft.; but the gas accounted for showed a reduction of only 108,000 c.ft.—the leakage being reduced by 1·69 p.ct. The capital per million cubic feet now stands at £432, as compared with £743 seven years ago, when Mr. Henry Rule took over the management. The Directors unanimously voted Mr. Rule an increase of £25 in recognition of his valuable services.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Elimination of Tar Fog.

Sir,—I have read with interest Mr. Marshall's remarks respecting "P. & A." extractors.

No doubt, they can be made to give good results; but my experience with five or six of them has not been satisfactory, and in all cases I have found it necessary to make use of considerable differential pressure. With our apparatus, there is no difference between the inlet and outlet pressure of the main stream of gas; and only about 20 p.ct. of the total volume has to be increased in pressure by 10 or 12 in.

I should also like to say that the altered machines on which our tests were taken have been working many months without any attention; and no one was more surprised than myself at the great difference in the quantity of tar and condensate extracted by them as compared with the results obtained when they were "P. & A." extractors.

J. Fisher, Assistant Engineer,
Tottenham District Light, Heat, and Power Company.

July 14, 1917.

"Coalite."

Sir,—Judging from the business doing in "Coalite" shares, the Company appears to be on the war-path again; and one is led to suppose that the public are induced to part with their money on the strength of the installation at Barnsley (Barnsley Smokeless Fuel Company), which is the latest offshoot of "Coalite." The fact that the Government (the Treasury) advanced £10,000 on debentures to the Barnsley Smokeless Fuel Company has been exploited for all it is worth. But the thoughtful man is inclined to inquire on what grounds the Treasury parted with public money for it.

Has the "Coalite" concern ever been able to prove to the Treasury its ability to provide a national demand, or has it even an experimental works which the expert advisers of the Government have been able to control so as to arrive at the data which justified the advance of the £10,000. The writer thinks not. Any sensible man would have hesitated, looking at the history of "Coalite."

It was conceived by the late Mr. Thomas Parker (a man quite ignorant of the elements of gas engineering), under whose technical guidance disaster after disaster overtook the concern—*vide* Wednesfield, Plymouth, and the colossal failure at Barking, which failures squandered practically half-a-million of pounds. Now "Coalite" is banking again on the plant at Barnsley—not even as yet tried.

Before the writer is the prospectus of the Barnsley Smokeless Fuel Company, and it repays study by one interested in "low-temperature carbonization," and conversant to a slight extent with the fundamentals underlying such processes.

Now in the first place, it is necessary to investigate the Barnsley claims. These are, generally, a smokeless fuel or coke containing a considerable percentage of volatile matter, which is known as "Coalite" (a good fuel if it *does* contain the alleged volatile matter), large volumes of motor spirit, benzol, toluol, zylol, and carbolic and cresyllic acid or oils.

Now to any scientific man conversant with the production of low-temperature oils or tars, it must be clear that benzol, toluol, and zylol, which are saturated hydrocarbons, cannot be produced in anything like payable quantities by a *bonâ-fide* low-temperature process, by which is meant a process working with iron retorts at a temperature varying from 1000° to 1200° Fahr. At these temperatures there might be traces of saturated hydrocarbons, but no more. The bulk of the oils would consist of unsaturated hydrocarbons or else paraffinoids known as motor spirits.

An expert of repute controlling the results at a low-temperature works near London has constituted the fact that the degree of temperature required for the production of the saturated or benzol series of hydrocarbons is not lower than 1400° Fahr.; that, to obtain the full value, the temperature must be raised from 1800° to 2000° Fahr., which is approximating to the temperature employed by gas-works in their fire-clay retorts.

One cannot produce benzol and at the same time motor spirits by the same operation; and it is clear that if the temperature is so raised as to produce the former, the resultant coke will not contain much volatile matter, and will approach the quality of ordinary coke.

Extraordinary secrecy has drawn a veil over the Barnsley plant, and the writer cannot find a description of it in any technical journal of standing. But it is reported that the retorts are of fire-brick—in fact, miniature coke-ovens. This points to the fact that they are a distinct departure from the original "Coalite" process, and in fact designed for a more or less high-temperature operation. This leads one to wonder what constitutes the "Coalite" patents, considering how they have wandered from the original sheet-iron tubes of Mr. Parker's day, through "slots" at Plymouth and Barking, to small coke-ovens at Barnsley.

But reading between the lines of the contracts entered into by "Coalite" (under agreement No. 5B.), it appears that a German invention of the Stettiner Chamotte Fabrik, Stettin, is forming one of the bases of the new Barnsley installation. Should this prove to be the fact, then our Treasury has gone out of its way to supply £10,000 of British money to back up a German invention.

Nemo.

July 13, 1917.

With a view to restricting the consumption of coal, the London County Council have arranged for the installation of gas fires and radiators at the Chief Station and the superintendents' stations of the fire brigade.

Mr. W. Dawes, of Normanton, who previous to enlisting twelve months ago was assistant at the Normanton Gas-Works, has been given a Commission in the R.G.A. (S.R.) Anti-Aircraft Section. Lieut. Dawes has been in training at the R.A. Cadet School, London, and the R.A. School of Gunnery, Shoeburyness.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Coal Supply in France.

Major NEWMAN asked the Prime Minister whether he was aware of the apprehensions felt by our French allies at the shortage of fuel in Paris and elsewhere during the coming winter, and whether, in the event of shortage of labour and tonnage preventing this country placing an adequate amount at their disposal, the Government would themselves take over certain coal mines and place the same at the disposal of the French Government—the coal to be worked by French labour, and transported in French bottoms to its destination?

Sir ALBERT STANLEY (the President of the Board of Trade), replying on behalf of the Prime Minister, remarked that the Government had already taken possession of the coal mines. The question of the maintenance of supplies of coal to the allies was one of shipping; and the Shipping Controller was taking every step possible to secure a supply of coal to our ally.

Major NEWMAN asked if the right hon. gentleman was fully aware of the anxiety felt in Paris on this question. It was very important.

Sir A. STANLEY said he appreciated that there had been a shortage of coal. He hoped they would take steps to secure some mitigation of the difficulty.

Coal Industry (State Control).

Mr. DUNCAN MILLAR asked the President of the Board of Trade whether he was in a position to announce the financial arrangements which had been entered into with the coalowners in connection with the State control of the coal industry.

Mr. ROBERTS, in reply, said a scheme had been drawn up, and had been very fully discussed with representatives of the Mining Association; but it had not yet been given its final form.

Mr. MILLAR asked how such a very long delay had taken place in settling the scheme, and whether it would be published in the form of a White Paper when it was completed.

Mr. ROBERTS said the negotiations had been more protracted than he contemplated when making previous replies. He would consider the latter question.

Workmen's Compensation Payments.

Captain WATSON asked whether, in view of the increased cost of living, the Government would take steps to increase the amounts payable under the Workmen's Compensation Acts to workmen and dependants.

Sir G. CAVE, replying on behalf of the Prime Minister, said the Government had had the question under consideration, and had consulted representatives of the employers and workmen on the subject. He hoped to be in a position shortly to make a definite announcement.

Bills Royal Assented.

The following Bills received the Royal Assent: Gas Light and Coke Company's Bill, Haslemere and District Gas Bill, Hemel Hempsted Gas Bill, Kenilworth Gas Bill, Lea Bridge District Gas Bill.

LEGAL INTELLIGENCE.

BIG WAR PROFIT ON A COAL-TAR DYE.

Enemy Coal-Tar Dye Patent.

The Patents Court heard on Thursday of a coal-tar dye bought at less than a shilling a pound before the war which has since been sold at more than a sovereign! The transaction was mentioned while Messrs. Levenstein, Ltd., of Manchester, were applying to have voided the German trade mark "Rhodamine," upon the ground that it was a generic name and not a name for a particular substance.

Mr. G. B. ELLIS, who represented the applicants, said they desired to make the substance known as "Rhodamine," which was a rose-red dye. Patent No. 15,374 of 1887, stated that the name applied "to the entire group of colouring matters belonging to the said series of phohaleines. The generic name of rhodamine may therefore henceforth be applied." The trade mark was registered by the Badische Anilin und Soda Fabric.

Mr. J. Y. JOHNSON, for the owners of the trade mark, contended that the Patents Court was not the Court before which the application to void should have been brought. It ought to have been tried out in the Law Courts.

Mr. ELLIS said this Court dealt with the patents of alien enemies. There was concurrent jurisdiction, because of emergency legislation.

The CONTROLLER OF PATENTS (Mr. Temple Franks) said he would report to the Board of Trade on the application, and Messrs. Levenstein, Ltd., would hear from them in due course.

ACRI-FLAVINE MANUFACTURE.

The novel question whether a coal-tar product, which is obtained by other means than those indicated in a German patent specification, can he said to be covered by the patent, was discussed last Thursday in the Patents Court before the Controller (Mr. Temple Franks) and Sir Cornelius Dalton.

The question was raised during an application to manufacture "acriflavine" by Jeyes Sanitary Compounds Company, Ltd., who asked for licence to use the German patent No. 24,652, of 1910, in the name of Cassella, which is a patent for a yellow dye-stuft. This dye, however, had been discovered to be the finest antiseptic for war surgery.

Mr. G. B. ELLIS appeared for the applicants, and Mr. CARPMAEL for Casellas.

Mr. *Joseph Tertius Smith*, the Technical Adviser in charge of the manufacturing department of the applicant firm, gave evidence to the effect that he had been in communication with the Medical Research Committee, and they were prepared to do all they could to assist him in the establishment of a plant for manufacturing acri-flavine. The process was an extremely long and tedious one; and it took them weeks to manufacture the small quantity that up to the present they had obtained. Having, however, mastered the process, future production would be comparatively simple.

Mr. *W. C. Reynolds*, the Company's Chemical Adviser, mentioned the interesting fact that they had obtained acri-flavine by a process which was not set out in Casella's patent specification.

Mr. ELLIS asked whether, as they were not making the substance by the process described in the patent, they ought to pay royalty to the patentee.

Mr. CARPMAEL said that if the applicants did not pay a royalty for producing the same thing, the production was at their risk. After the war, they may have a claim for damages.

Mr. ELLIS said the applicants felt they had better have a licence to guard against any possible claim.

The CONTROLLER said the licence would be as in the previous cases—a purely nominal one.

Ex-Secretary of a Gas Company Sentenced.

At the Sussex Assizes, before Mr. Justice Darling, Russell Cory, aged 40, ex-Secretary of the Haywards Heath and District Gas Company, who was on bail, was indicted for forging and uttering cheques for the payment of £88 5s. and £68 13s. 9d., with intent to defraud, and also for stealing £91 17s. 2d., the money of the Haywards Heath and District Gas Company, under circumstances recorded in the "JOURNAL" for May 1, p. 196. Prisoner, who pleased guilty, wore the uniform of the R.G.A. Mr. R. Dratton Bushe, for the prosecution, said he was afraid the amounts mentioned in the indictment did not cover the whole of the defalcations, which were about £1000. For the defence, Mr. W. L. White, senior partner in a firm of chartered accountants, said prisoner was in the employ of the firm for many years, during which he was a good and capable business man. Lieutenant Thompsett, R.G.A., said prisoner belonged to his battery, which he joined on June 1; and from that time he had proved an extremely hard-working man and an excellent soldier. On behalf of the accused, Mr. Gordon said that in 1908 prisoner had an illness which appeared to have lessened his moral fibre. Unfortunately, he took to drink; and eventually he became indebted to a number of people. Instead of going to his friends for help, he commenced these defalcations. He was very anxious to take part in the war; and he hoped his Lordship would consider he was of far more use in the army, out of the way of monetary temptations. Prisoner did not agree that the defalcations amounted to so much as £1000. His Lordship said these defalcations had extended over a period of nine years. He could not, in the interests of public law, agree to the suggestion that prisoner should be allowed to go to France. He must inflict a sentence which he would pass in time of peace; and it must be left for the Home Office or the War Office to decide whether it should stand. Prisoner must go to penal servitude for three years.

MISCELLANEOUS NEWS.

ELECTRICITY AND GAS IN GERMANY.

RESTRICTIONS UPON CONSUMPTION IN THE ENTIRE EMPIRE.

[Translated from the "Vossische Zeltung," June 28.]

It has proved itself necessary to place the consumption of gas and electricity under regulation and control. As in Germany both are produced almost exclusively from coal, it is also a case here of preventing unnecessary consumption resulting in waste of coal, which should be reserved in the first place for purposes of the war and war equipment.

In order to secure expert supervision, a Special "Central Electricity and Gas Department" was instituted, and placed under the management of Prof. Kübler, with offices at No. 28, Königgrätzer Strasse, Berlin.

The increase in the consumption of electricity and gas during the year has been enormous. The consumption of electricity, which was 1916, in Berlin alone the increase on the corresponding month of the 2600 million K.W.H. in 1913, now amounts to 10,000 millions. In May, previous year was at the rate of 70 p.ct. The consumption of gas also shows an increase.

Part of the increase, of course, is attributable to war industries, in which work is, in many cases, carried on day and night. More gas than formerly is also being used for driving gas-engines, for crucible and tempering ovens, and for other ovens for technical purposes of the most varied character.

As peace-time superabundance had accustomed us to work with full margins, and without economizing through any anxiety, it is all the easier to impose restrictions without prejudice to our productive capacity—especially as exceptions will be made in cases of important war work.

The restriction in the case of electricity has been fixed to begin with at 10 p.ct.; and its application will be gradually extended from Berlin to the whole of the German Empire. How far a restriction in the use of gas is possible cannot yet be determined, as certain difficulties have

to be dealt with. Nevertheless, there is scarcely any doubt that the new department will find ways and means to bring about a restriction in the consumption of gas also, as desired.

One cause of the increased consumption of gas and electricity is doubtless attributable to the circumstance that in the past long and severe winter the delivery of coal could not be regularly maintained, owing to the freezing of the water-ways. As a consequence, there was a rush for gas and electric stoves, which in Berlin were sold-out in next to no time. In certain towns—*e.g.*, Frankfort-on-Main, the installation of new gas-fires and stoves has now been forbidden. Accordingly, we may in time expect regulations in regard to heating by gas and electricity to be applied equally over the whole of the German Empire, and thus avoid waste.

Our greatest extravagance has been in the matter of lighting. Already in peace time voices were raised on different occasions in protest at our revelry in such exaggerated amplitude of lighting. The number of lamps in use was constantly on the increase, as well as their lighting power. In restaurants, cafés, &c., the whole place was strewn with incandescent glow-lamps, and the chandeliers, &c,, also carried a considerable number. At the same time, the candle power was gradually raised from 16 to 25 c.p., then to 50 c.p., and, finally, to 100 c.p. ; so that one was dazzled. The many separate points of light were actually disturbing to the eyes—in fact, to such an extent that the matter received attention by eye specialists.

In dwelling houses also the use of glow-lamps in large numbers for ceiling illumination, in addition to many lamps on chandeliers, &c., became more and more general ; and at last 100 c.p. lamps were not uncommon. It is especially in this direction that much economy is possible. One still sees, when walking through the streets in the evenings, chandeliers in dwelling houses carrying six or twelve lamps alight. In the cafés also, in which one no longer reads newspapers, but which now resemble concert rooms, lamps are placed everywhere.

In Holland and France, for example, the front part of the café is generally kept fairly dark, with only the inner portion illuminated, as the people there like to observe through the large shop windows the movement on the street, and the light would interfere with their so doing. In general, therefore, the restriction in the use of artificial light can be easily carried through, although many do not know how they are to set about it. The matter is, however, very simple.

All one has to do is to look at one's electricity bill for the previous year, and, using one's electricity meter as a control, to arrange to use 10 p.ct. less than one did before. A very good way to secure a reduction in the consumption is to change the high candle-power lamps for low-power lamps, and to remove a number of the lamps from the chandeliers. For writing-table lamps, 16 or 25 c.p. is sufficient, especially if one provides for the reflection of the light on to the writing table by means of a white reflector. Altogether unnecessary in dwelling houses are 100 c.p. lamps. In addition, economy may be effected by reducing the period of lighting by 10 p.ct.—*i.e.*, one should only light up for 54 minutes instead of 60 minutes, as formerly. For instance, if one were accustomed to read from 8 till 11 in the evening, one would now leave off 18 minutes earlier.

In view of the many available means for securing economy in lighting, it will not be difficult for an individual to discover that which is suitable to his own case. Anyone who is able to apply several of these methods, and thereby secure a larger reduction than 10 p.ct., will be helping on our war equipment industry and the Fatherland.

THE WRECKED GASHOLDERS AT ASHTON.

Result of the Coroner's Inquiry.

All doubts which may have existed in the lay mind as to whether the two holders of the Ashton Gas Company (situated some 90 yards from the scene of the disaster at the Ashton-under-Lyne Chemical Works) exploded following the T.N.T. explosion on June 13 were set at rest at the adjourned inquest on the victims held by the Manchester County Coroner (Mr. G. S. Leresche) last Thursday.

All the witnesses examined by the Coroner were asked if they heard the gasholders explode, and not one of them could say that he did—in fact, several stated emphatically that nothing of the kind happened.

Walter Holmes, a plumber at the Chemical Works, stated that immediately after the explosion the gasholder on the Grosvenor Street side of the works seemed to part about a third from the top, and split round. The gas which rushed out was blown by the wind in the direction of Dukinfield, and became one mass of flame. There was a lot of burning material floating about in the air at the time.

Answering Mr. C. H. Booth, who represented the Gas Company, witness said the gas in this particular holder burned itself out. It did not explode. The top of the holder seemed to "lift" 12 or 15 feet, and then fall back into the tank.

A workman employed by the Gas Company said he was working at one of the holders at the time of the explosion. He heard a bang as though something had struck the holder, and then the gas became alight.

The Coroner : The holder did not explode ?

Witness : No, it collapsed.

Dr. *Edgar*, a representative of the Ministry of Munitions who is on the staff of the Explosives Supply Department, and who visited the factory immediately after the disaster, said he was perfectly certain that the gasholders did not explode.

Mr. Booth, at the conclusion of the evidence, said he wished to make a statement on behalf of the Ashton-under-Lyne Gas Company. There was an impression abroad, he said, that the holders belonging to the Company had exploded. The Company, before the inquiry opened, were perfectly satisfied that nothing of the kind did happen, or could happen. He would like to take the opportunity of satisfying the public mind on the point, however, by making the statement in open Court. The evidence was that only one explosion occurred, and that was at the chemical works. The holders were torn open by flying débris ; and consequently the escaping gas became alight and burned itself out. Immediately the explosion was notified to Mr. Joseph Townsley (the Engineer and Manager of the Gas Company), he turned off the gas at the works, and cut off the mains supplying the streets in the locality, thereby taking precautions against any explosion that might have occurred.

On behalf of the Directors of the Company, Mr. Booth associated himself with the sympathy which had been extended to the bereaved and the injured.

The verdict of the Jury was that the victims met their death by accident.

LABOUR-SAVING IN THE HOME.

Mrs. Peel on the Service of Gas.

Economy is in the air. It has penetrated the home in more ways than one. Labour-saving in the dwelling-house is being talked about, and labour-saving and economy are synonymous. Labour-saving does not mean neglect ; it means the abolition of unnecessary work by the utilization of modern means of doing things, and so the liberation of more time in which to do things better, and to promote more healthful conditions—particularly for mothers, for children, and for servants. The fathers are not heard much of in this matter. In this question of labour-saving in the home, the gas industry is concerned. Its domestic appliances are all labour-saving ; and therefore it is to its advantage that labour-saving in the home should be talked about freely, and that those engaged in this mission of emancipation from unnecessary domestic work should have complete knowledge of the value of what the gas industry has to offer. It all helps to make the ideal home.

The matter of labour-saving in the home was the subject of a lecture last Tuesday afternoon by Mrs. C. S. Peel, of the Ministry of Food, at the National Economy Exhibition, in the new London County Council Hall by Westminster Bridge. On the occasion, Mrs. Lloyd George presided. What was heard went to prove that the average home is built to make work, and not to save it. The widespread indictment made as to labour waste does not say much for individual energy in bringing about labour-saving conditions, though in personal reasons there should be ample inducement. Yet the waste of labour that goes on day by day means waste of time, waste of strength, and waste of lives. The suggestions for improvement that came from Mrs. Peel were many. But there was not one that she emphasized more than that, in order to save labour, there should be substitution of gas or electricity for coal. She also considered householders should demand a hot-water service as well as a cold-water service. Further, she advocated public kitchens. In this connection, she remarked that it must be realized once for all that human life and happiness are of more value than money. What followed showed that there had been good study of the waste of labour caused through coal purchase, delivery, storage, fires, and resultant ashes, dirt, smoke, and soot accumulation, together with all the consequent cleaning, all of which is multiplied by the number of fires in use, intensified by the kitchen coal-range. Eliminate coal, and Mrs. Peel (from her personal experience) states that one-third of the work of a household is saved, as well as the expense of extra cleaning and renovation. It was clear that from the work point of view, she abhors coal, and prefers gas or electric fires, supplemented by hot-water radiators. But there is a reservation. She likes to keep herself linked-up with the old barbarism of using raw coal and destroying all that it contains of benefit to mankind to the extent of having one coal-fire in the room in which she chiefly sits. We will not grumble at that. If all people could be got to become converts to rational heating to the degree that Mrs. Peel has become one, a great advantage to mankind would have been achieved.

But there are one or two criticisms to make of Mrs. Peel's advocacy. In company with gas heating, she suggested electric heating. National economy does not merely comprise labour and food ; it includes fuel. And the attention of this public counsellor may be directed to what is said to-day in our "Electric Supply Memoranda" on the relationship of electric-fires to the waste of the thermal and like value of the coal. On the other hand, the carbonization of coal at a gas-works not only produces gaseous fuel, but smokeless coke, dye requisites, materials for explosives making, sulphur for sulphuric acid, disinfectants, antiseptics, and many other things of vast importance. These are matters that should be in the *repertoire* of every public lecturer on national economy. There is also the hot-water-from-the-main plan. It looks possible enough to the layman or the laywoman. It does so to Mrs. Peel. "Then," said she, "you have to consider the washing and the cleaning bill. In our ideal house, we do away with all the bother of providing hot water ; and we wash and warm ourselves by hot water drawn from the main. If you can get a cold-water service, why not a hot-water one ? There is no reason. It can be done." What is more, Mrs. Peel says : "It must be done." We are always sorry to disappoint a lady. We admit that the supply of hot water by public mains can be done ; that it must be done is another matter. When the world is filled with plutocrats, and there are no poor, when there is no squalor, and everything is beautiful, we may be able to afford the capital expenditure which will admit of the lagging of street-mains to such an extensive degree that there will be little or no heat losses in the journeying of the hot water through the main streets and by-ways. This must be done ; otherwise the water would not run from the central heating station, and be delivered hot at the dwelling-house—especially in winter, and the worse the greater the distance. Of course, heat losses in circulation are not matters that appeal to the idealist ; and that the prevention of heat losses might make the expense of the public supply of hot water equal to the war time cost of beer—mayhap of spirits and even champagne—is a detail that does not hinder the free flow of thought and proposition. The public supply of hot water is an ideal that suffices for the platform. But we have to step from the ideal to the practical. A gas-heated circulating-boiler in the house, a gas-heated geyser properly flue fitted, a gas-heated copper, or a coke-heated circulating-boiler—any one of these comes within the range of practical politics without the uneconomy of a huge capital expenditure and an immense waste of heat.

Much more was, of course, heard as to how to bring labour in the

home to the minimum; and Mrs. Peel finished with the "text" with which she began: "The greatest labour-saving apparatus which we possess is the brain, and it has not been worn out by too much use," which has about it a large amount of truth, mixed judiciously with sarcasm on the prevailing indolence in the matter of the utilizing of means that save labour.

Questions were subsequently put by a number of members of the audience. Among the speakers was Mr. H. V. Lanchester, who asked that anyone who had suggestions to make on the subject of labour-saving in houses should address them to the Secretary of the National House and Town Planning Council at 41, Russell Square, W.C., who would submit them for consideration to their Technical Committee.

ROCHDALE GAS ACCOUNTS.

The Rochdale Corporation accounts for the year ended March 31 last show the income of the gas undertaking to have been £113,000, and the working expenses £90,000; leaving a gross profit of £23,000. The net profit is £3741, as against £15,000 the previous year.

Commenting on the matter, the Gas Committee state that there has been a reduction in the income from sales of gas amounting to £6412. The quantity consumed for lighting purposes being 54,868,400 c.ft., or 13⅓ p.ct. less than last year. Approximately one-third of this quantity is due to the reduction in public lighting and two-thirds to the general restriction in private consumption and the operation of the Summer Time Act. There has, however, been an increase of 8 millions in the quantity consumed for purposes other than lighting, attributable to the greater quantity of gas employed for industrial purposes in munitions and other works, as well as in hospitals and canteens, and the more general adoption of gaseous fuel owing to the difficulty experienced in obtaining supplies of coal. This difficulty has continued to be a source of anxiety to the Committee throughout the winter; for, notwithstanding the large stock of coal accumulated during the summer, it was reduced to dangerously small proportions before the severe weather came to an end. It was found impossible to secure contracts for more than about two-thirds of the normal requirements of coal during the year; but there were balances undelivered on previous contracts which sufficed to make up the difference between the quantity contracted for and the diminished quantity actually required. Although all coal mines have since been placed under Government control, the same difficulty in securing supplies still exists; and the problem of meeting future demands awaits solution.

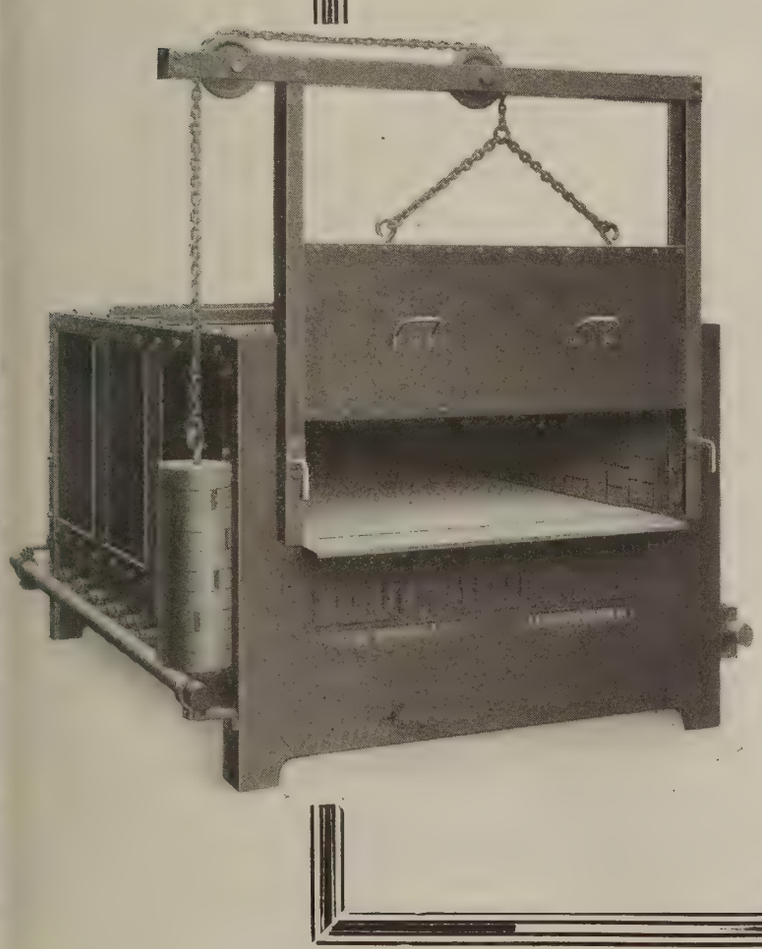
Residual products realized satisfactory prices throughout the year; but the smaller amount of coal used has necessarily reduced the quantities produced, and the enhanced cost of labour and materials employed in their treatment has adversely affected the net income therefrom. This, however, has amounted to 11s. 2d. per ton of coal carbonized, compared with 9s. 11·9d. last year. The cost of coal, including cartage to the works and stacking, has been 20s. 6·7d. this year, as against 17s. 10·9d. last year—an increase of 2s. 7·8d. per ton, due to the fact that last year there were upwards of 24,000 tons of coal received at the prices current before the Coal Prices Limitation Act was passed. So that, in spite of the reduction in the quantity used, the cost of coal is actually £1520 more than last year.

The working expenses have been kept within the narrowest possible limits; and notwithstanding the drop in revenue of £6412 and the increase of £1520 in the cost of coal, the gross profit carried to net revenue account is only £5936 less than last year. The serious increase, however, in the charge for income-tax, amounting to £4958, materially diminishes the surplus; and there remains only £3741 net profit to be transferred to the appropriation account. This is inadequate to meet the annual charges of £4500 for the reserve fund and £1500 for working capital. There will remain, therefore, a debit balance on revenue account of £2258 at the commencement of the new financial year.

OLDBURY GAS-WORKS ACCOUNTS.

The annual report and statement of accounts of the Oldbury Urban District Council Gas Department has been issued by Mr. Charles H. Carder (the Engineer and Manager), who states that they have been fortunate in being able to maintain an uninterrupted and adequate supply of gas. The Ministry of Munitions have expressed their appreciation of the results obtained in toluene extraction; and plant has been provided to further assist the Ministry in the provision of high explosives. Public lighting was discontinued throughout practically the whole year, and the balance of the amount received under the public lighting contract has been placed to a reserve fund to meet the expense of reinstating the lamps and lanterns when lighting is resumed. Provision has been made for repayment of a first instalment of £500 of the loan raised to defray the cost of the No. 3 holder. The financial results on the whole are very satisfactory; and the overdraft they have so long had at the bank has been replaced by a balance in hand. The market for residuals has continued good throughout the year; the net revenue from this source being equal to 14s. 7·5d. per ton of coal carbonized, as compared with 13s. 2·2d. last year and 8s. 8·6d. the previous year. After making provision for depreciation of stocks, the accounts show gross profits of £6268, and a net profit of £2249.

The loan capital now outstanding is £54,674, and the amount repaid £30,724. The manufacture of gas cost £18,189; distribution, £1924; public lighting, £34; rents, rates, taxes, £2315; management, £456; war allowances and National Health Insurance, £679—total expenditure, £23,600, compared with £22,220 the previous year. The gross profit was £6268, compared with £6545, being equivalent to 10·76d. per 1000 c.ft. of gas sold. The amount required for interest and sinking fund was 6·72d. per 1000 c.ft. sold. On the income side, the



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sales of gas were: Prepayment meter supplies, 31,742,300 c.ft., revenue, £6724, against £5983 the previous year; ordinary meters, 56,293,100 c.ft., revenue, £9648, against £9487; motive power, 51,745,500 c.ft., revenue, £5915, against £4902—total, £22,288, against £20,372. For public lighting £600 was received, of which £565 is put to reserve for renewals. The income from residual products was: Coke and breeze (less haulage and labour) £6174, against £5687; tar, £776, against £853; ammoniacal liquor, £1323, against £1212; total (less discounts and allowances), £8038, compared with £7570. The total revenue was £29,868, compared with £28,765 the previous year. The net cost into holders was 17·43d. per 1000 c.ft. sold, against 17·58d. per 1000 c.ft. sold the previous year.

The profit and loss account shows interest and repayment on loans account £3909, income-tax undercharged in previous years £204, net profit £2249, against £3277 the previous year. The balance brought forward from last account was £3648; making a total disposable balance of £5897. Of this, £639 is transferred to capital account for the roof over the purifiers and new meters, mains, and services, and £1065 written-off the value of Consols; leaving £4193 to be carried forward. The balance at credit of loans account is £3768.

The working statement for the year shows: Coal carbonized, 10,988 tons, against 11,485 tons; coal gas made, 142,642,000 c.ft., against 145,161,000 c.ft.; carburetted water gas made, 17,728,000 c.ft., against 12,797,000 c.ft.; gas made per ton of coal, 12,981 c.ft., against 12,639 c.ft.; percentage of carburetted water gas, 11·05, against 8; gas sold and used on works, 141,553,900 c.ft., against 143,553,400 c.ft., leakage and unaccounted for, 18,696,100 c.ft., against 14,585,600 c.ft., being 11·66 p.ct. against 9·22 p.ct. The total gas sent out from the works was 160,250,000 c.ft., against 158,139,000 c.ft., an increase of 1·27 p.ct. The coke made per ton of coal was 12·3 cwt., against 12·50 cwt.; coke sold per ton of coal, 8·43 cwt., against 9·29 cwt.; tar made per ton of coal 11·3 gallons, against 10·9 gallons; liquor made per ton of coal, 25·9 gallons, against 26·1.

The report was presented at a meeting of the Council last Friday week; and the Chairman of the Gas Committee (Councillor E. W. Jackson) said they considered it very satisfactory, and so, he thought, would the Council and the ratepayers. The gross profit was £6268, compared with £6542 the previous year, and a gross loss of £1385 two years ago; while the net profit of £2249 compared with a net profit of £3277 the previous year, and a net loss of £1842 two years ago. They had wiped off the balance of the overdraft at the bank of over £1000, and had made some provision for the repayment of the loan of £6200 for the new holder. The sales of gas from slot-meters had decreased by 418,000 c.ft., and from ordinary meters by 2,205,000 c.ft.; but there had been an increase of 5,649,000 c.ft. in the sales for motive power. So that the net increase of sales was 3,026,000 c.ft.; while the revenue had increased by £1915. The coke sold had been less by 792 tons, as there was less coal carbonized and more water gas made, for which the coke was used; but the value of the coke sold had increased by £487. The average price per ton had been 26s. 6d., compared with 20s. 6d. at a neighbouring works and 19s. at a works farther away. The total value of the residuals had increased by £468, and it worked out at 14s. 7½d. per ton of coal carbonized. The increased make of gas per ton of coal carbonized had saved 1350 tons of coal in the last two years. The average cost of coal had been 23s. 2d. per ton, against 22s. 3d. the previous year; and on the total quantity carbonized the increase was £503. Income-tax amounted to £1457, against £429 the previous year—an increase of £1028. During the current year they would have to provide £1000 out of revenue to meet the increased war bonus to the employees.

The accounts were approved.

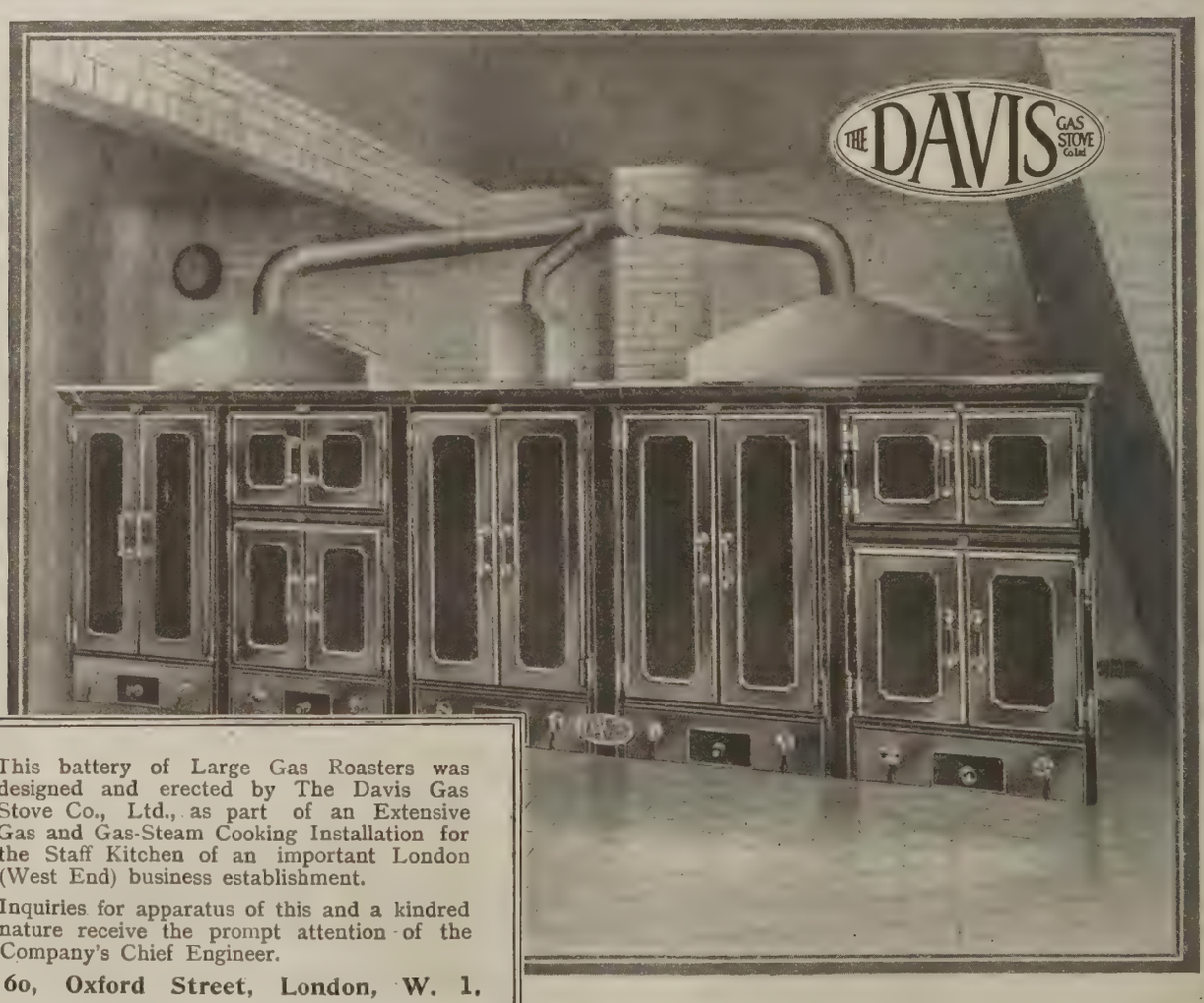
DUNFERMLINE GAS-WORKS.

At a Special Meeting of the Dunfermline Town Council, the report of the Special Committee appointed to deal with questions at the gas-works was presented.

The Committee are of opinion that the responsibility for the unsatisfactory state of the gas supply during last winter [*ante*, p. 32] rests primarily with the Gas Manager, but that the conditions were aggravated by the shortage of coal supply and by the use of coal which, having been in stock for some time, had deteriorated. The plant and machinery at the gas-works were ample for the supply of gas, but an error of judgment was committed when the horizontal retorts were allowed to fall into disrepair, and reliance was placed entirely upon being able to bring into use the newer vertical retorts under construction. These retorts are in a leaking condition, and incapable of producing the quantity of gas which they ought to be capable of doing; and this has arisen from lack of control of the subordinate workmen at the works. The Committee make the following recommendations: That the management of the accounting department be separated from the management of the works, and that all the other departments continue to be under the management of Mr. Waddell. That a competent Assistant Manager be at once appointed. That the repair of the vertical retorts be carried out at as early a date as possible. That an official be appointed who shall act as Accountant, Cashier, and Collector for the Gas Department, and be responsible to the Gas Committee direct.

The Council agreed to adopt the report and recommendations.

The report of the Committee is remarkable because of the absence of any reference to the serious labour troubles experienced at the gas-works during the past winter. Mr. Waddell, in his report, states that the difficulty of obtaining the necessary number of men suitable for working the plant was the root cause, and forms adequate explanation of the whole position of affairs at the works. The labour difficulty upset all calculations as to bringing into use at the beginning of the winter the new installation of vertical retorts, and the same cause prevented the retorts working to advantage. Mr. Waddell is agreeably



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surprised at the condition of the vertical retorts requiring only that the cracks be properly repaired. He is quite satisfied that the design needs no serious alteration, and confirms his three years' experience with the first setting, which still continues to give good results.

OSSETT GAS-WORKS RESULTS.

In his annual report, Mr. Arnold E. Mottram, the Gas Engineer and Manager to the Ossett Town Council, states that during last year 147 million cubic feet of gas were made and 134¾ millions sold—a decreased make of 6½ millions and a decreased sale of 7¼ millions. Over three millions of the decreased output is due to the further restrictions of street lighting, and the remainder is due to the alteration of the clock by the Summer Time Act. The consumption by gas engines continues to grow very satisfactorily.

The gross profit for the year is £6537. Interest and sinking fund charges amount to £7532, leaving a loss on the year of £994. Deducting from this the balance of £257 brought forward from last year, leaves a net loss to carry forward of £737. The increased sum paid for income-tax alone amounts to £756, which more than covers the loss carried forward. Last year the Committee only paid the advanced price for coal for part of the year, so they have this year an increase of £519 to pay, despite the fact that they have used over 300 tons less. A greater war bonus by £117 was paid last year; and ammoniacal liquor has dropped £466. These items, together with the greatly increased price of all materials and labour, and the curtailment of lighting, have made it impossible for the Committee to return the usual profit. Of coke, 5285 tons was sold, equal to 10·2 cwt. per ton; liquor, 370,990 gallons, equal to 35·4 gallons per ton. No tar has been sold during the year undistilled, and the new plant was late in being completed, so that it only worked part of the season. War conditions and the severe winter made working very difficult during the busy period; but the Committee managed to keep up the full supply of gas. The short delivery of coal added to their difficulty, as they had to take out of stock 2500 tons. This was a double expense, as the coal will have to be replaced, if possible, before next winter.

WORKING OF THE KENDAL GAS UNDERTAKING.

The annual report of the Engineer and Manager (Mr. W. R. Wilson), which was presented at the last meeting of the Kendal Town Council, stated that the gross profit of the gas department for the year ended March 31 amounted to £4422; and after setting aside £3775 for interest and sinking fund charges and £69 for war allowances, there was left a surplus of £578. Out of this and the balance brought down, they had bought £1200 of War Stock and had voted £150 to the renewals fund. The reserve fund remained at £5000; and the sinking fund, including debt repaid, stood at £21,307. The total quantity of coal carbonized amounted to £7298 tons; being a decrease of 1443 tons, or 16·5 p.ct., on the previous year. The cost of the coal delivered on the works was £8908, or 24s. 4·91d. per ton. The gas made was 93,026,500 c.ft., being a decrease of 4,584,000 c.ft., or 5·88 p.ct. The gas sent out from the works showed a decrease of 5,878,900 c.ft., or 6·58 p.ct. Public lighting exhibited a decrease (on pre-war) of 6,614,400 c.ft. A comparison of results was given with the new Woodall-Duckham vertical retorts, against the hand-charged horizontals on a basis of 93,026,500 c.ft. annual make of gas. This comparison [which will be found on p. 75 of last week's "JOURNAL"] showed that on the vertical retorts there was a gross saving of £1745, and that after meeting the interest and redemption on capital outlay of £691 there remained a net saving of £1054.

Alderman Monkhouse, in presenting the report, said that the reason they had come out so well was, in the first instance, owing to the fact that they had substituted vertical for horizontal retorts. If they had delayed making the change, it would have been inevitable that they would have shown a rather serious deficit. The sales of gas had brought in £13,072, as against £13,736 the previous year; but the deficiency had been almost met by the very high price of residuals, which showed an increase of £489. Carbonizing wages were just about half what they would have been under the old system. They could well afford to keep gas at its present price; and compared with many other places they were very fortunate. Under the new system, they were making considerably more gas from less coal.

ANNUAL GAS REPORT AT WORKINGTON.

Woodall-Duckham Vertical Retort Results.

Reporting on the operations of the Workington Corporation gas undertaking for the financial year ended last March, the Engineer and Manager (Mr. Horace Chamberlain) says that this being the first complete year the new Woodall-Duckham vertical retort installation has been in operation, the working results must be taken as the standard for subsequent years. The object has been to obtain as high a yield of gas as possible; and the value of the increase has far exceeded the slight reduction in the quantity of residuals available for sale per ton of coal carbonized. Apart from this, the decreased quantity of coal required has enabled the Gas Department to meet the demand for gas, which was within 3 p.ct. of that of the previous year, and at the same time to effect the 10 p.ct. reduction in the quantity of coal carbonized, as requested by the Government. There were 9346 tons of coal used, compared with 10,372 tons the previous year; the total make of gas being 129,941,000 c.ft., against 133,910,000 c.ft.,

and the make per ton 13,891 c.ft., as compared with 12,910 c.ft. The unaccounted-for gas was reduced from 8·16 p.ct. to 7 85 p ct. The Borough Treasurer (Mr. John Noble) reports that the gross profit for the year is £3141, which is an increase of £358 on the year preceding. The net deficit is £142, which is more than accounted for by the increase in rates, taxes, insurances, and the price of coal.

The Mayor (Mr. F. Hall), in a separate report, makes the following allusion to the Woodall-Duckham vertical retorts.

We estimated that the increased earning capacity of a vertical installation, based on the carbonizing of 10,000 tons of coal per annum, at 15s. per ton, with a yield of 12,549 c.ft. of gas per ton of coal carbonized, would amount to £2560 per annum, as compared with the earnings for the year ended March 31, 1913.

The actual results for the past year are as follows

Extra cost of coal—viz., difference between 13s. 6d. per ton in 1913, and 20s. in 1917—6s. 6d. on 9346 tons of coal carbonized		£3037	9 0
Coal saved, owing to the increased yield of gas, 1917, 13,891 c.ft. per ton; 1913, 11,549 c.ft. per ton—viz., 2342 c.ft. per ton of coal carbonized equals (say) 1-5th, or 20 p.ct., equals 2336 tons 10 cwt. at (say), 10s. per ton (after allowing 10s. per ton for value of residuals)		1218	5 0
Increased rates and taxes :			
1917	£1495 15 0		
1913	937 17 7		
		557	17 5
Cost of management, including proportion of town hall salaries, collection, stationery, and printing, &c., establishment charges—			
1917	£810 16 8		
1913	650 9 3		
		160	7 5
War bonus (wages)		262	4 11
War wages (allowances to men on active service)		194	7 6
		£5430	11 3
Less—Difference in gross profit:—			
1913	£3773 13 5		
1917	3141 8 0		
		632	5 5
Net increased earning of new plant for the year ended March 31, 1917		£4798	5 10

Thus had the same prices and conditions obtained last year as they did in 1913, the Council would have had £4798 5s. 10d. at its disposal either for the reduction of the North Ward rates or of the price of gas, or a division between the two, instead of a net loss of £142, as per balance-sheet. It is hard lines for us, after spending £32,000 on new plant, that this remarkable increase in earnings should be swallowed up principally by the increased cost of coal. On the other hand, it ought to be a source of satisfaction to the consumers that the price of gas would have been at least 8d. per 1000 c.ft. more than they are now paying if we had been working on old lines.

The difference between the estimated profit of £2560 and the actual of £4798 is due to the initiative of Mr. Chamberlain. But it should be borne in mind that this could not have been done but for the wonderful control which is possible in the actual working conditions of our Woodall-Duckham plant, as it can, at the will of the operator (given a margin of working plant), be run at any speed of throughput he may determine.

Mr. Chamberlain discussed the lines on which our report was based, and showed that by an alteration of procedure, and by a slightly reduced yield of residual products, much better results could be obtained; and this, coupled with the fact that we are first and foremost gas manufacturers, and that the value of the bye-products (notably sulphate of ammonia) would, owing to the developments of the synthetic process of manufacture, after the war be very considerably reduced, and also that the selling price of tar, through the greatly increased and increasing quantity made by coking plants, had been reduced 12s. 6d. per ton, I agreed that he should turn his attention to increasing and obtaining every foot of good gas possible out of the coal, the result of which has been as set forth in the above figures.

When the reports came before the Council, it was pointed out that the price of gas has not been increased to the consumers.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 16.

There is a fair demand for pitch for the home trade, and inquiries for shipment over next season are increasing. Makers, however, do not seem anxious to sell ahead. The Government have now taken control of all creosote, and sales can only be made under licence. Solvent naphtha continues in good demand. The price is 2s. 2d. to 2s. 3d. net and naked at sellers' works.

Considerable orders for sulphate of ammonia for agricultural purposes are being placed at the prices fixed.

Tar Products in the Provinces.

July 16.

Markets for tar products remain the same. The prices given fo pitch are quite nominal.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

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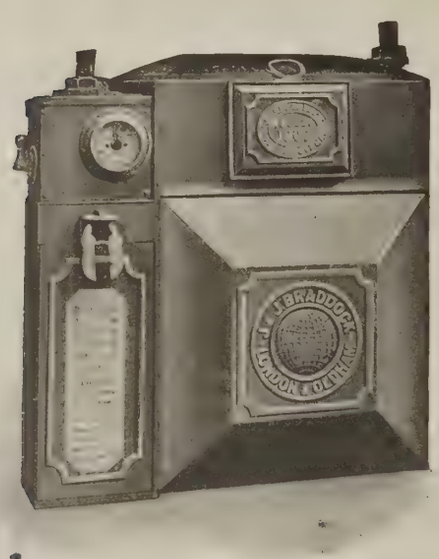

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COAL TRADE REPORT.

Northern Coal Trade.

There is a brisk demand for the best classes of coal, both steam and gas; but other qualities are easy. There is not only the continued scarcity of steamers, but the rules of the Controller need readjustment of the prices in some of the contracts. Best Northumbrian steams are steady at 30s. per ton f.o.b.; second-class descriptions are about 25s. 6d. to 26s.; and steam smalls are in ample supply at from 18s. 6d. to 20s. In the gas coal trade, the best kinds are firm, but other qualities are not so brisk. The home demand is a little firmer; and it must now be expected to grow week by week, as stocks are not thought to be heavy generally and the consumption should be larger. Exports are rather irregular—steamers being scarce. Best Durham gas coals are about 25s. to 25s. 6d. per ton f.o.b.; second-class qualities are quiet at about 23s. 6d.; and "Wear specials" are firm, and vary in price from 27s. to 30s. Nothing more is known as to the large contracts for gas coals. The regulations of the Controller "do not apply to coal conveyed to a port for shipment;" and this is the case with much of the gas coal of Durham. At the same time, the regulations introduce an element of uncertainty into the duration of contracts for part of the output—at least, until the extent of their influence on the coal trade is defined. Gas coke is from 30s. 6d. to 32s. per ton f.o.b., according to class and place of shipment. Coke freights are firm at 45s. to 45s. 6d. Tyne to Dunkirk.

Sheffield Gas Company's Bill.—The Parliamentary Committee of the Sheffield Corporation, reporting upon the Gas Company's Bill, say the Bill was considered by a Select Committee of the House of Commons early in May. In the first instance it was announced that the Company had decided to withdraw the clauses relating to the manufacture and supply of power gas; but they still desired the powers as to coke-oven gas. No deduction on account of the elimination of power gas was made from the capital powers asked for. In the result the Chairman announced that the Committee found the preamble of the Bill had been proved. They decided that coke-oven gas was not to be used for lighting purposes. Later, as the result of the action of the Corporation, a clause was added providing that if the Company do not within three years from the passing of the Bill secure powers to construct gas-works on a site not now belonging to them, their borrowing powers under the Act shall be reduced from £1,285,000 to £285,000. The Corporation lodged a petition against the Bill in the House of Lords; but as the Company, after a further interview, met the Corporation's requirements with respect to the interference with streets, and agreed to insert in the Act a clause satisfactory to the Highway and Sewerage Committee, and made other modifications at the request of the Committee, it was agreed that the petition should be withdrawn.

Creosote Restrictions.

The Minister of Munitions orders that all users or consumers of creosote oil, green oil, sharp oil, anthracene oil, or other oils with a specific gravity of 1·000 or more, distilled from coal tar, and all oils with a specific gravity of ·950 or more distilled from other tars, shall within fourteen days furnish to the Controller of Mineral Oil Production, M.P.S.3, No. 8, Northumberland Avenue, London, W.C. 2, particulars as to the source of supply, the quantity used during the first six months of 1917, the amount estimated for use for the second six months of the year, and the uses to which the oil is put. It is further ordered that, until further notice, no person shall, except under and in accordance with the terms of a licence issued under the authority of the Minister of Munitions, use any creosote (whether as a solvent or otherwise) for or in connection with the water-proofing, preservation, or treatment of timber or wood of any kind or description, or the manufacture, repair, preservation, or treatment of any road or path in the United Kingdom, or any part of such road or path. No person shall until further notice offer to sell, sell, or (except for the purpose of carrying out a contract in writing existing prior to such date for the sale of creosote) enter into any transaction or negotiation in relation to the sale of creosote, except under a licence. All applications for licences under this Order shall be made to the Director-General of Munitions Supply, Ministry of Munitions, Whitehall Place, London, S.W. 1, and marked, "Creosote Licence."

Reduction in Price at Preston.—The Directors of the Preston Gas Company have reduced the price of gas by 2d. per 1000 c.ft. from the first of this month.

Suggested Lighting of Cootehill.—The Cootehill (co. Cavan) Urban Council, having considered the question of the lighting of the town, have directed the Clerk to prepare a report on the subject of gas mains and lamps required.

Oldbury Gas-Works Employees' War Bonus.—The Oldbury Gas Committee, with the consent of the Council, have agreed to grant a war bonus to the employees at the gas-works of 1s. 8d. a day, making 9s. a week. This is in accordance with the Birmingham award, and means an increased burden on the undertaking of £1000 per annum. This extra sum is to be found out of the revenue next year.

Barnes and the Calorific Standard.—At the Barnes Urban District Council, a letter was read from Messrs. Lees & Co., Parliamentary Agents, with reference to the Richmond Gas Company and the calorific standard, and enclosing the Company's replies to the Council's objections to the application to the Board of Trade for an Order under the above Act. The Company concede three of the points raised, but object to (1) the abolition of the two hours notice of testing, and (2) the tests being made at any reasonable hour. It was resolved that Messrs. Lees & Co. should write to the Board of Trade pressing these two points.

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The Future Demand for Benzol.

Questions are frequently asked as to the demand for crude benzol "after the war;" and an interesting side-light is thrown on the subject by an address delivered by Mr. V. H. Manning, Director of the United States Bureau of Mines, at a conference of the Business Publishers' Association, held at Washington. He said that notwithstanding increased production and reduced exports, the country was drawing on its stocks of petroleum and gasolene; and that conservation—not necessarily tying up, but wiser and more careful consumption—was urgently called for. Nearly 60 p.ct. of the total production of gasolene was consumed by automobiles, less than 25 p.ct. was exported, and the balance was used for various other purposes. Petroleum and its products, of which gasolene was only one, were an absolute national necessity. For one thing, the use of crude petroleum as a fuel should be stopped. Official records showed that the marketed production in 1916 was 295 million barrels—the largest yet attained; but during the year the stock had been reduced from 170 to 150 million barrels. The consumption exceeded the 1915 production by some 13 p.ct.; and if the normal peace consumption proceeded at the same rate during the present year, it would exceed the 1916 production by 40 million barrels. This did not take account of extra war consumption, obviously difficult to forecast, but in any case considerable, or of the fact that the 1917 output would probably be less than that in the previous year. Out of the stock of 150 million barrels, it was possible that 60 million barrels would be drawn before the end of the year. Products of coal distillation were used in Europe as motor fuels, and might in time be adopted in America, as the construction of bye-product coke-ovens was rapidly extending.

Malta and Mediterranean Gas Company, Limited.—At the annual meeting of the Company to-day, the Directors will report that the balance of the general revenue account for the year ended March 31 is £5405. They recommend the payment of the usual dividends on the first and second preference capital, and a dividend of 4 p.ct., free of income-tax, on the ordinary capital—making with the interim payment 6 p.ct. for the year. This will leave a balance of £678 to be carried forward.

Beehive Coke Production in the United States.—The production of beehive coke in 1916 was the greatest ever recorded in the United States; and the average value per ton was higher than in any previous year. The official figures published by the United States Geological Survey show that 35,464,224 tons, valued at $95,468,127, were produced last year. The output in 1916 represented an increase over 1915 of 7,955,969 tons, or 29 p.ct., in quantity, and $38,522,584, or nearly 68 p.ct., in value.

Coal Prices in the Isle of Wight.—That present prices are causing industrial unrest was emphatically declared in the course of an inquiry held, by direction of the Controller of Coal Mines, into the retail prices of coal in the Isle of Wight. It was stated that coal which could be sold at Southampton for 40s. and 41s. per ton was disposed of in the island at anything from 52s. to 56s. per ton. "The island was very seldom unanimous on any matter," said Alderman Fellows, of Cowes, "but it was absolutely unanimous in desiring cheaper coal." Major Sweetman stated that the military in the Isle of Wight received only one tender this year, to supply coal at 59s. per ton, as against 52s. 10d. in the previous year. It was iniquitous that they should be asked to pay such a price.

Macclesfield Gas Committee and Coal for Householders.—The suggestion was made at the last meeting of the Macclesfield Town Council that, in view of the Government's recommendation that householders should lay in stocks of coal during the summer months, the Gas Committee ought to obtain a large stock with a view to relieving any possible pressure during the winter. Alderman Isherwood, the Chairman of the Gas Committee, said a Sub-Committee had already been appointed, and they were dealing with the situation. If the Corporation thought there was likely to be any shortage of coal in the borough, no doubt they would purchase a quantity (say, 1000 tons), and store it in the gas-works' yard. If the coal was not disposed of, the Gas Committee could use it in the ordinary way.

Stockport Tar-Distilling Plant.—At the last meeting of the Stockport Gas Committee, the Engineer (Mr. S. Meunier) reported that he had had an interview with members of the Explosives Department of the Ministry of Munitions with reference to borrowing for tar-distilling plant, when a promise was made that the matter should be thoroughly gone into and the decision communicated. He also reported that on the same day he had an interview with the Priority Department of the Ministry of Munitions, and that, as a result, he had obtained a special permit and priority classification for the tar-distilling plant, and any material required for it. He stated that particulars of the annual repairs to be done were left with the Priority Department; and the classes and quantities of materials absolutely necessary had been forwarded in accordance with their request. The Council unanimously approved the action of the Engineer.

Coalite Shares.—In their "City Notes" last Thursday, the "Westminster Gazette" wrote: There are certain shares in the Stock Exchange markets which enjoy the reputation for spasmodic animation—patches of pronounced activity being followed by periods of comparative stagnation, the latter to be broken again by further briskness from time to time. Among these shares, those of the Coalite Companies afford conspicuous examples. Just now, British Coalite ordinary and deferred, and Coalite ordinary and deferred, make up a quartet in which an active business is being done. The buying of the shares comes from the Provinces as well as from London. Rumour has it that the Companies' patents dealing with the bye-products of coal, to assist in the generation of low power, are likely to turn out very valuable; and on the strength of the glowing future which is held to be ahead of the Company, a good deal of speculative buying is taking place. The difficulty at a time like this is to realize that the day will come when the market is certain to fall once more upon quietude; and that this day will probably arrive as soon as the mild speculation which is at present assisting the prices of the shares has petered-out, or flowed in other directions.

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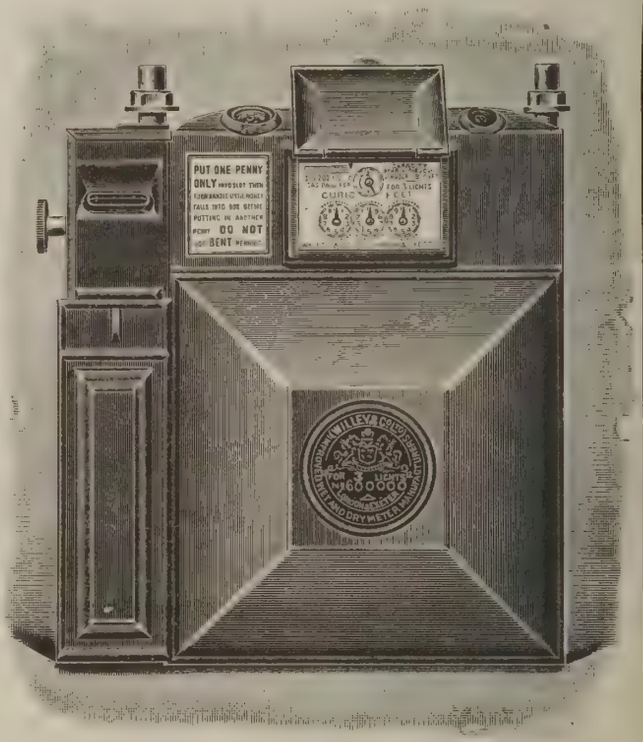

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A Deficiency at Carlisle.

The accounts of the Carlisle Corporation gas undertaking for the past financial year show a gross profit of £3583, compared with £2803 last year, an increase of £780. In the revenue account, the income exhibits an increase of £6540, of which £4314 is under the head of gas-rental, £2518 from coke, £302 from sulphate of ammonia, and £336 from fittings; while tar has brought in £919 less than last year. On the expenditure side of the account, the chief increase is under the head of manufacture, which is more by £5717, mainly due to the higher prices paid for coal and oil. Other items of increased expenditure are war bonus to workmen and officials, which is £1013 more than last year, and allowance to men serving with the army or navy, which is £279 higher. The charges for income-tax, repayment of loans, and interest, as set out in the profit and loss account, are £3947, an increase of £65. The deficiency on the year's working is £298, to which is to be added the balance from last year, £475, making a total deficiency on this account at March 31 last of £773. To this, the professional Auditors (Messrs. Blackburn) point out, must be added the £1760 charged to capital in previous years, and for which there were no borrowing powers. They hold that this should be cleared up by a transfer from the reserve fund, if it cannot be met out of revenue. When the details of the year's operations were presented to the Council, the Mayor (Alderman J. P. Buck) said he thought that they might congratulate the Engineer (Mr. E. G. Hutchinson) on the figures he had placed before them.

Price Increased at Brighton and Hove.—At the Hove Corporation a letter was read from the Brighton and Hove Gas Company, stating that, owing to the increase in the cost of coal, oil, and the increase in wages, the Directors are compelled to give notice of an increase of 4d. per 1000 c.ft. in the charge for gas as from the date of the meter readings for the June quarter.

Increased Output at Fraserburgh.—The output of gas at Fraserburgh shows an increase of 30·92 p.ct. upon the corresponding period of last year. There is an increase in the gas sales of £759, and in residuals of £174. Leakage for the past year exhibits a decrease of 1·34 p.ct., and the make of gas per ton of coal carbonized an increase of 615 c.ft. per ton. The price of gas is raised to 5s. 2½d. per 1000 c.ft. Coal for the works costs 26s. 6¼d. per ton free on rail.

Waterford Gas Supply.—The Waterford Corporation have adopted a resolution for providing a plant to test the gas supplied by the Company. One member said the illuminating power of the gas at present was absurdly low; while another pointed out that the Company are taking out certain constituents of the gas for the Ministry of Munitions—testing of the gas being therefore prohibited during the war. Several members dissented from this; and the Mayor (Dr. J. J. O'Sullivan) said they could proceed for a penalty if the gas in their own establishments was not as per contract. Mr. B. O'Shaughnessy, F.I.C., was appointed Gas Tester.

Gas Affairs at Walsall.—The Gas Committee of the Walsall Town Council report that the net profit of the undertaking for the twelve months ended March 31 last was £2476, as compared with £7563 in the previous year. The following increased prices are to be charged for gas as from the June readings of the meters: In the borough of Walsall and district, for manufacturing and power purposes (including gas-driven vehicles), irrespective of quantity, a flat-rate of 2s. 4d. per 1000 c.ft.; for lighting and domestic purposes, 3s. (less 2½ p.ct. discount if paid on delivery or at the offices within one month of delivery); for slot meters (less 2½ p.ct. discount), 3s. 4d. In Pelsall, Shelfield, Aldridge, and Great Barr, for manufacturing and power purposes, irrespective of quantity, a flat-rate of 3s. 4d.; for lighting and domestic purposes, 3s. 11d. (less 2½ p.ct. discount as above); for slot meters, 4s. 2d. net. At the meeting of the Council yesterday (Monday) week, when submitting the annual report of the Gas Committee, the Chairman said that the undertaking had of late been passing through abnormal times, owing to the high prices of all raw materials. A loss of £1500 had been incurred owing to the restrictions on public lighting; while the cost of oil and materials had gone up by £4800, and rates and taxes by £3080. Compared with pre-war prices, coal had cost £11,176 more; while altogether the extra payments amounted to £16,833. The Council approved the proposal of the Gas Committee to increase the charges forgas.

News is to hand that Mr. William Wilmot, who has been one of Messrs. Falk, Stadelmann, & Co.'s country representatives for fifteen years—latterly more particularly covering the Manchester district—has, after a few days' illness, died from pneumonia. He recently joined the R.N.A.S., and almost immediately was attacked by the illness which caused his death.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 11.]

Nos. 9496—9857.

ALEXANDER, G. H.—"Fluid-flow measuring or indicating instruments." No. 9798.

CARMONT, W. H.—"Gas-stove." No. 9599.

COPISAROW, M.—"Treatment of crude anthracene to isolate main constituents therefrom." No. 9559.

HIGGINS, W.—"Portable gasholders." No. 9643.

HOLLINGDRAKE, H.—"Means for controlling flow of liquids." No. 9799.

NASH, R. J.—"Fluid-flow measuring or indicating instruments." No. 9798.

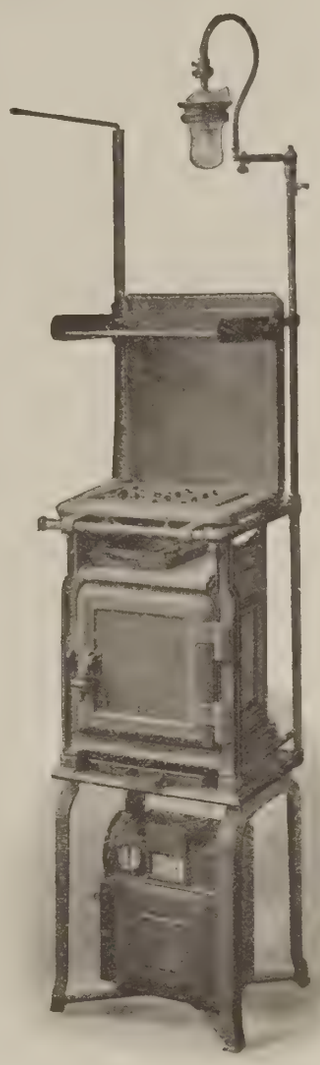
POORE, P.—"Destructive distillation of wood." No. 9667.

SULMAN, H. L.—See Poore, No. 9667.

TURNER, F.—See Hollingdrake. No. 9799.

WELSENAAR, J. H.—"Burners for cookers, &c.." No. 9678.

Slot Installations



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Dividends declared by Scottish gas undertakings include Langholm Gas Company 6 p.ct., and Catrine Gas Company 1s. per share. The cost of gas coal at Catrine, including cartage, is 20s. 6d. per ton. At Kirriemuir, the dividend is 6 p ct., and a sum is set aside for depreciation.

The Motor Bus Department of the Todmorden Corporation are experimenting with coal gas. The flexible holder has a canvas outer covering, with an inner layer of rubber. So far as the experiments have gone, it is considered that the cost of working with gas will be only about one-fourth of that of petrol at its present prices.

STOCK MARKET REPORT.

The course of things on the Stock Exchange was to a large extent just the counterpart or continuation of the week before. The general tone was calm, confident, and cheerful. A momentary pause, it is true, occurred on Wednesday, owing to the Nieuport incident, painted very red in Hun despatches. But when its minor importance became known, all went well again. The wonderful progress of Russian arms in Galicia was once more the potent factor to inspire the situation and endow the markets with solidity and strength. But here, again (as in the week before), the unwelcome feature was the persistent shrinkage in the volume of business. There is a pronounced reluctance to sell, and markets are denuded of stock. If some impatience is felt at this, there is, on the other hand, a growing conviction that the war is quickening to a close, and that with peace commercial activities must revive.

The gilt-edged market remained steady. Home Government issues, with War Loan in the van, were firm, and Indians and Colonials were in demand. Home Rails began well, but fell very quiet towards the close. The American Market fluctuated, and Argentines moved fitfully at times. The Foreign Market had many interesting points. Russians progressed steadily, as might be expected, the French Loan was in good demand, and Scandinavian and Brazilian found favour. There was some inquiry for British Coalite—based, it may be assumed, on some expectations.

Business in the Gas Market showed a pleasing improvement in point of activity; and, if we were not now so nearly approaching the August season of slackness, one might almost hope for a real revival, but it will scarcely have time to materialize. Bargains were well distributed; and there was a welcome accession of undertakings in which operations are not often recorded. The general tendency, too, was favourable, and prices seemed to be creeping up; while changes in quotation were mostly in the upward direction. This feature was very noticeable in all *ex div.* variations.

Bargains done for cash during the week were as follows: On Monday, European 11¼, Gas Light ordinary 71⅜, 72¼, ditto debenture 57, Imperial Continental 80¼, 80⅜, 80⅜, 81, Monte Video 8⅜, Newcastle 70½, South Metropolitan 74⅝, 75. On Tuesday, Alliance and Dublin 51½, European 11¾, Ilford "A" and "C" 97⅛, 97⅝, ditto "B" 76¼, 76⅜, ditto debenture 66, 66½, Imperial Continental 80, 80¼, Primitiva 38s. 6d., South Metropolitan 74, 74¼, Tottenham "B" 70, 70¼, Harrow 5 p.ct. 84⅞, 85. On Wednesday, Gas Light ordinary 71½, 71$\frac{11}{16}$, 71⅜, 72, ditto maximum 57, 57½, ditto preference 73, 73⅜, ditto debenture 56½, Imperial Continental 81, South Metropolitan 74, 74⅝, 74¾. On Thursday, Brentford "B" 80½, Commercial 3½ p.ct. 67¼, Continental Union preference 61, European 11½, 11⅝, Gas Light ordinary 71⅜, 72, 72½, 72¼, 72½, ditto maximum 56½, 57½, ditto preference 73½, ditto debenture 56⅝, Monte Video 8½, Primitiva preference 60s., South Metropolitan 74, Barnet "C" 137, Gloucester ordinary 78½, 79. On Friday, Buenos Aires 54¼, 54½, Cape Town 2¾, Commercial debenture 51½, Gas Light ordinary 72, 72¼, 72⅜, 72½, Imperial Continental 80, 80½, Newcastle 70¾, Primitiva 38s. 9d., 39s. 3d., preference 60s., South Metropolitan 74, 74¼, Maidstone 54⅜, 54⅝.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex. Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	53–63	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59–64	50–55	51½
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76–79	57–62*	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞–6⅜	4⅜–5¼	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water (10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.)	15–15½	2⅜–30	..
383,110	10	"	7	7/-			2⅜–26	..
115,000	10	"	6	6/-			10⅜–11½	..
159,740	—	—	—	4%		13½–14	9¼–9⅜	..
992,045	Stk.	Feb. 26	14	5$\frac{1}{19}$%		..	69–71	..
734,920	"	"	11	4⅛%	Brentford A Consolid.	261–266	79–82*	..
55,000	"	"	5	5%	Do. B New	204–209	77–80*	80½
221,400	"	June 11	4	4%	Do. 5 p.c. Pref.	109–111	81–86*	..
217,380	"	Feb. 26	11	10%	Do. 4 p.c. Deb.	91–93	65–67	..
244,200	"	"	8	7%	Brighton & Hove Orig.	208–213	150–155	..
530,000	20	Mar. 26	12½	22/6	Do. A Ord. Stk.	154–159	102–107	..
120,000	Stk.	June 26	4	4%	British	44–45	33–34	..
245,771	"	"	4	4%	Do. 4 p.c. Deb. Stk.	88–90	66–68	..
100,000	10	—	—	—	Buenos Aires 4 p.c. Deb.	85–87	5⅛–56	54¼–54½
100,000	10	—	—	4½%	Cape Town & Dis., Ltd.	1½–2½	2½–3	2¾
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Pref.	4–6	6½–7½	..
157,150	"	Feb. 26	5	5%	Do. 4½ p.c. Deb. Stk.	70–75	60–65	..
1,513,280	"	Feb. 12	5/9/4	49/4	Chester 5 p.c. Ord.	108–110	79½–80½	..
560 000	"	"	5½	46/8	Commercial 4 p.c. Stk.	106–108	72–74	..
475,000	"	June 11	3	3%	Do. 3½ p c. do.	103–105	68–68	67½
800,000	"	"	4	—	Do. 3 p.c. Deb. Stk.	69½–71½	51–53	51½
200,000	"	"	7	—	Continental Union Ltd.	76–79	39–41	..
278,400	—	"	—	11½%	Do. 7 p.c. Pref.	115–118	60–62	..
—	—	—	—	10%	Croydon B and C 7 p.c..	..	170–180	..
492,270	Stk.	—	6	5½%	Do. E	..	..	..
55,000	"	—	4	4%	Derby Con. Stk.	123–125	95–100	..
1,002,180	10	July 29	10	7/6	Do. Deb. Stk.	102–104	80–83	..
16,313,430	Stk.	Feb. 10	4/17/4	42/-	European, Ltd.	17½–18	11–12	11½–11⅝
2,600,000	"	"	3½	3½%	Gas Light and Coke (4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds)	98–102	71–73	71½–72½
4,062,235	"	"	4	4%		76–79	56–58	56½–57½
4,674 850	"	June 11	3	3%		96–99	72–74	73–73½
130,000	"	"	10	10%		72½–74½	55–57	56½–57
258,740	"	Mar. 12	5	4½%		..	..	..
70,000	10	April 29	11	6%	Hastings & St. L. 3½ p.c.	87–89	50–55	..
86,600	—	—	—	9½%	Hongkong & China, Ltd.	16½–16½	7⅞–8½	..
131,000	Stk.	Mar. 12	7⅞	7⅞%	Hornsey 7 p.c..	..	120–130	..
65,780	"	"	6⅜	5⅞%	Ilford A and C.	151–154	95–100	97⅓–97⅝
65,500	"	June 26	4	4%	Do. B	115–118	75–80	76½–76⅜
4,940,000	"	May 14	9	4½%	Do. 4 p.c. Deb	92–94	65–68	66–66½
1,235,000	"	Feb. 12	3½	3½%	Imperial Continental	150–160	79–84	80–81
235,242	"	Mar. 12	6½	6½%	Do. 3½ p.c. Deb. Red.	84–86	62–65	..
2,498,905	"	Feb. 26	10	5%	Lea Bridge Ord. 5 p.c.	119–121	85–90	..
					Liverpool 5 p.c. Ord. (A, B)	211–213 / 146–148	82–83	..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72–74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛–4⅝	3⅞–4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99–101	88–98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛–12	8–8½	8⅛–8⅜
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅜–99½	70½–71	70½–70¾
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82–83	71–73	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c..	14–15	10–11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	104–106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼–7⅜	2–3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128–131	92–97	..
100,000	50	"	12	11%	Do. C	118–121	85–90	..
52,000	50	"	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛–6	1⅞–2⅛	3⅜/6–39/3
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝–5	2⅝–3⅛	60/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91–93	78–80	78¾–79
—	—	—	—	4%	Do. " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85–87	59–61	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref., 5 p.c. Deb.)	10⅛–11	7⅜–8⅛	..
125,000	50	July 1	5	5%		47–49	40–42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223–224	..	..
209,984	"	"	10	10%	Do. B	222–224	178–182	..
523,500	"	"	10	10%	Do. C	220–222	..	..
90,000	10	May 28	9	6/-	South African.	10½–11⅛	8⅜–9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111–113	73–75	74–7
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb.	72½–74½	55–57*	..
224,820	"	Feb. 26	8½	8%	South Shields Con. Stk.	157–159	140–142	..
952,795	"	"	6	48/4	S'th Suburb'n Ord. 5 p.c.	114–116	76–78	..
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110–112	77–79	..
135,000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116–118	86–88	..
647,740	"	May 14	5	5%	Southampton Ord.	99–102	76–78	..
120,000	"	Feb. 12	7½	5%	Tottenham District (A 5 p.c., B 3½ p.c., 4 p.c. Deb.)	135–138	95–100	..
782,275	"	"	6	3⅛%		115–117	68–73	70–70½
181,255	"	June 26	4	4%		87–89	63–65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	60–65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½–109½	89–91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c..	151–156	114–119	..
255,636	"	"	6½	65/-	Do. B 3½ p.c.	129–134	99–101	..
108,075	"	"	5/17/3	56/-	Do. C 3½ p.c.	110–115	86–91	..
352,000	"	"	6⅜	58/9	Wimbledon 5 p.c.	117–122	88–93	..
98,000	"	"	6⅜	65/-	Epsom 5 p.c.	121–126	96–101	..
88 416	"	June 26	3	3%	3 p.c. Deb. Stk.	66–69	50–53	..

* Ex. Div.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Working Manager. No. 6327.

Engineer and Manager. Stratford-on-Avon Corporation. Applications by July 31.

Works Manager (Tar Works). No. 6325.

Assistant Manager. Peterborough Gas Company.

Representatives. No. 6316.

Sulphate Maker and Yardman. Tiverton Gas-Works.

Stoker. Tiverton Gas-Works.

Appointments, &c., Wanted.

Show-Room and Sales Manager. No. 6326.

Plant, &c., for Sale.

Cookers. Alliance and Dublin Consumers' Gas Company, Hawkins Street, Dublin.

TENDERS FOR

Coal.

Macclesfield Gas Department. Tenders by July 28.

Crude Gas Liquors.

Blackpool Gas Department.

Purifying Material.

Edinburgh and Leith Gas Commissioners.

Tar and Liquor.

Malvern Gas Department. Tenders by July 23.

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXIX., No. 2828.] TUESDAY, JULY 24, 1917. [69TH YEAR.

EDITORIAL NOTES.

Steps to Financial Relief for Gas Undertakings.

How many men in the gas industry have ever stopped, in the rush and pressure of current circumstances, to inquire whether they know of any other industry that is so oppressively financially conditioned and handicapped in these times as the one to which they themselves belong. They would have difficulty in finding another. Take the chief industries working under special statutory powers. There are the railways under present control, with—be the costs of coal, labour, and materials, and the other conditions of working, what they may—a decent dividend guaranteed. There are the electricity supply undertakings, with in most cases a right to a minimum sum of 13s. 4d. a quarter for any consumption under twenty units, and a maximum of 8d. per unit may be charged. For lighting, with metallic filament lamps, the unit is only equal to 800 candle-hours, for heating 3420 B.Th.U., and for power 1¼ H.P.H. With incandescent gas-burners the 800 candle-hours can be obtained with a consumption of 32 c.ft., the 3420 B.Th.U. by the combustion of 7 c.ft., and the 1¼ H.P.H. by the use of (say) 20 c.ft., or rather more according to load. This indicates the great difference allowed by Parliament between gas and electric charges on the basis of equivalent service. Certain of the electric concerns have obtained permission from the Board of Trade, for the period of the war and for a time after, to exceed their prescribed maximum charges. Furthermore, electricity companies are not working under a sliding-scale; and no great change is seen in the war-time dividends of the normally paying concerns. There are the coal mines (which are not statutory concerns, though with general legislation specially applying to them), not in ordinary times regulated in any manner so far as charges and profits are concerned, now under control; and the scheme which the Coal Controller has been arranging in consultation with the various Coal Associations provides for (it is understood) the maintenance of the pre-war return upon the capital investment in the mines.

There are other statutorily controlled industries or undertakings; but there is not one so financially tightlaced as is the gas industry. There is confidence in challenging denial of this. The causes for this are of long past and comparatively recent origin. Some of those of recent origin disclose the highly essential character of the industry to the nation; but those in high places responsible to the nation for being just in their administration and control appear to be guided by the strange principle that the more indispensable is the industry, the less shall be the consideration meted out to it at the time when consideration is most needed. The gas industry is in one respect suffering from the fact that it is one of the pioneer industries to work under the control of Parliament. It has, in consequence, been largely the subject of experimental legislation; and step by step in every direction —capital issues, dividends, gas prices, reserves, and carry-forward—there has been regulation. In part, this refers more to private gas enterprise than to municipal gas undertakings. But the latter have certain regulations applied; and upon them as upon private undertakings there fall the war time burdens, as well as the revenue restrictions imposed by past legislation and accentuated by present conditions, together with the revenue limitations produced by departmental governing of the prices of certain commodities and export prohibition.

The cost of coal delivered on the works is terribly high; the cost of oil (if it can be obtained) is prohibitive for gas making, or supplies have to be used very sparingly; the export of coke can only be made under licence; sulphate of ammonia exports are prohibited; tar can only be sold after all that the Ministry of Munitions require has been removed from it; pitch is largely unsaleable on account of freights and shortage of tonnage; prices are limited for all the products of oil and tar washing and distillation needed by the Ministry of Munitions; and sulphate of ammonia for home use has been fixed at a price that has made the producers give vent to their dissatisfaction. Never, we repeat, has there been an industry controlled more closely and more exactingly when more latitude is so necessary; and no other industry can allege itself to be a greater victim of legislative regulation and war effects acting in combination and cumulatively. The raw material of the industry is coal; and the coal industry is allowed to charge 4s. per ton extra (the Welsh part 6s. 6d.) in order to cover war expenses. The gas industry has to pay this additional charge per ton—running, without the extra paid to the Welsh and Forest of Dean collieries, to some £3,600,000 a year upon 1913-14 costs. It has to pay more for all the materials, the goods, and the labour it requires, including those that are essential to the making of the products needed by the Ministry of Munitions and the fertilizer necessary to the intensifying of the production of food. While the industry has to pay these higher wartime costs, with no allowance made for them, as in the case of the coal and sulphuric acid industries (so preserving their return upon capital), it has been decreed that it must be content with lean prices in present circumstances for the products required for munitions and for food production. The prices the farmer is to be paid for his cereals are controlled, but at figures that give a very good margin for his increased expenses; and it is the gas industry that has to supply him at a (having regard to costs from coal to acid, lime, wages, &c.) low price with the fertilizer that enables him to largely increase the produce from a given area of land, and the profits from that enlarged produce on the high-scale price allowed. From what has here been said, and from an examination of the position, it will be seen that the competitors of the gas industry for light, heat, power, and fertilizers other than sulphate of ammonia (true the supplies of other fertilizers are not great), are carrying on their business on much more favourable terms than the gas industry, which in the total has to contribute heavily to the national and local exchequers.

The case, therefore, seems to be complete, if only by contrast with the conditions obtaining in other industries, for some special consideration for the gas industry. What is now advanced generally regarding this matter is attested more particularly by the accounts of every gas undertaking in the United Kingdom. Some of them may have had during the period of the war a considerable augmentation of the business in gas through special demands for munition work. They are the favoured ones. But for them, too, the net profit per unit of production has been much below the pre-war level. Nearly two years and nine months have passed [see "JOURNAL," Nov. 3, 1914] since we first called attention to the then known and the possible effects of the war upon the financial conditions of the industry. But then ours was as the voice of one crying in the wilderness. The pre-war financial experiences in the industry—the ups and downs which it had safely encountered through the diversity of its business—gave its administrators to believe at the time that it could financially withstand almost any shock or weather any storm. There has since been disillusionment; and the lessons of the present particular form of adversity are of so practical a character as to make men not only think but act. Three years is a good

span; and we are within a few days of this being the time that there has been, owing to the war, a step-by-step ascent in the outgoings of the industry, and for sliding-scale companies a step-by-step descent in dividends owing to the necessity for again and again raising the price of gas, until now there are companies who cannot pay even their standard dividends, from which have to be deducted a heavy income-tax. Maximum priced gas companies, too, have been eating into their reserves in the hope of better times; and some of them are looking forward with any but pleasant feelings to the outcome of this year's working. Not a few local authority concerns have likewise been severely hit. The time has come when there should be no further delay in this matter; but the Board of Trade should be appealed to very insistently to move on behalf of the industry to relieve it from further financial depreciation by getting Parliament to sanction a scheme by which a fair return may be received on its capital, leaving the larger question of the revision of the sliding-scale to a more convenient time, when the industry and our legislators are better able to measure the differences between *post*-war conditions and those existing 42 years ago, when the terms of the sliding-scale were determined—surely not for all time and for all conditions. Whatever the old intention, the view has grown in the industry that we have now come to a pass when this matter must receive attention. The articles and correspondence in the "Journal," the references in speeches, the comment on the matter by Mr. A. E. Broadberry in his recent Presidential Address to the Institution of Gas Engineers, the allusions to the subject in the reports of the National Gas Council, the interviews and meetings on the question, all point to the extension of the feeling that the sliding-scale, with its unqualified terms, does not meet the need of all times and conditions.

There are other people who think the present conditions will soon roll by, and easier ones prevail. Who has any substantial ground for thinking so? Lord Kitchener said the war might last one year or three years. Do we yet look like being near the end and clearing up the terrible chaos? How long is it to be before we reach a *post*-war normality? One, two, three, or how many more years? Even then capital, materials, and labour are going to be dear. Who thought even two years ago the present conditions would prevail? Let the industry speculate no more on chances. But let it press for a scheme of relief, with which, under the authority of Parliament, it can meet the public, and charge a price fitting the circumstances and giving stockholders a fair return on their capital. Harder conditions and the growth of view that further effort should be made has led to the National Gas Council to take another step. This was decided on at a special meeting to consider the sliding-scale question after the general meeting of the Council on the 4th ult. It was then arranged that information should be collected, on behalf of the Council, from all gas undertakings, in the Commercial Section areas of the District Associations, and that each of the sections should nominate two representatives to join the Executive of the National Council to consider the information collected, with a view to arriving at a decision as to what steps (if any) should be taken to obtain relief. The inquiry that is being made covers all classes of undertakings; and the undertakings are asked to submit suggestions as to the steps they think it would be advisable to take for obtaining relief. It is very necessary that the Council should have the maximum of useful information and suggestion, so that they may go to the Board of Trade with the strongest possible case. The problem is a very serious one for the Executive Committee to handle; and it should receive their most earnest consideration before coming to any decision. Remember that the financial position in which the industry has arrived through legislation, war conditions, and price restrictions, is one from which there will not be immediate recovery on the termination of the war, which happy event may not occur before conditions are still worse for the industry. On these grounds, the industry should act as a whole; and let the managements of those undertakings that are exceptionally fortunate help and not hinder those less fortunate.

Gas Composition and the Board of Fuel Research.

The question of the composition of town gas is now in a fair way of receiving thorough investigation; and for the reputation and future of the industry we are not sorry. The Board of Trade has no doubt been moved to action by the pressure brought to bear by local authorities and the railway companies who have accumulated evidence—and some of it is very damaging evidence—that there are gas undertakings that have been distributing gas containing percentages of incombustibles largely in excess of what was justified even by the abnormal circumstances of current working. Now that the matter is coming to a head as a preliminary to parliamentary action, there is satisfaction in the fact that the investigation has been entrusted to so competent and (we believe) impartial a tribunal as the Board of Fuel Research, the members of which are fully alive to the needs of the times, as well as to the evil effects of any abuse of privileges in respect of avoidable gas adulteration. For this particular work, the Chairman of the Board (Sir George Beilby, F.R.S.) has high qualifications; and not long since at the Royal Society of Arts—this was at the time that Mr. H. M. Thornton read his last paper—he referred to the requirement in our national equipment of a greater production of cheap and, if necessary, of poorer fuel gas. The Hon. Sir Charles Parsons is aware—no one more so—of the need of the industries for cheap and smokeless means of generating steam and other forms of power, as well as of heating. What is true of the industries in regard to heating is equally true of the home. Mr. Richard Threlfall, F.R.S., as an electro-chemical engineer, knows the same. Sir R. Redmayne, K.C.B., his Majesty's Chief Inspector of Mines, is cognizant of the need for the economical use of coal by the fullest utilization of its constituents; and Prof. W. A. Bone, F.R.S., knows all the phases of the subject from beginning to end.

The investigation is one that cannot be hurried; and while the conclusions will unquestionably be far-reaching, the Board of Trade, and those who have been agitating for an investigation, will find that the problem is not so simple that any single determinate prescription for town gas will be forthcoming that can be applied to the whole gas supply of the country, unless it be one that possesses a very large margin which will give ample scope for all coals and for all methods of carbonization and conditions (including progressive depreciation) of plant, and which will, through its indiscriminate spaciousness, give greater liberty in some cases than in others. The reference by the Board of Trade to the Board of Fuel Research is to all intents and purposes divided into three distinct parts; the last one being subdivided. These parts are: (1) To advise as to the most suitable quality of gas; (2) the minimum pressure at which it should be generally supplied; and (3)—this bears upon the first part—the Board are to have regard to (*a*) the question of economy in the use of coal, (*b*) the adequate recovery of bye-products, and (*c*) the purposes for which gas is now used. It is a good thing that the Research Board has upon it men who are specialists in the utilization and chemistry of fuels, as there is room in this large reference for incompetency to go vastly astray.

Take the first and third parts together. Any advice given to the Board of Trade as to the most suitable quality of gas must take into consideration the question of the coals carbonized; for a large amount of economy is concentrated in employing the most available suitable coal, which can be delivered on the works at the lowest possible price. Our parliamentary authorities in the past—this is not their fault, it is the fault of those human limitations which prevent any man being a specialist in all things—have apparently thought that it is the easiest possible thing in the world to make gas economically to fit a universal single standard of quality. The probability is that the investigation by the Board of Fuel Research will disabuse their minds of this. It will in all likelihood be shown that it is not necessarily the calorific value of a gas as instrumentally measured that constitutes the most suitable quality for town purposes, but the gas, having regard to the cost of production, containing the largest percentage of combustibles, the flame temperature of which gas on its combustion is not depreciated by avoidable inert constituents, a fair limitation of which can only be determined by an analysis of the gas produced by different coals treated under different conditions of normal carbonization. But regard has to be paid to the question of the economy in the use of coal. Economy in its use by whom? The reference in this respect is a very open one. If the Board of Fuel Research broadly construe it, it leaves them to consider it from the aspect of economy in the use of coal both by the gas supplier and by other people who could employ either coke or a good combustible gas as fuel. The two directions of economy have a beneficial reciprocal tendency. The possibilities of the dilution of coal gas with a high combustible percentage gas made from coke is one

direction in which to look for coal economy. If there is economy there in cost, it may be the means of producing economy by supplanting the industrial and household use of coal by the resulting mixed gas—a gas of high heating quality—at a lower price than would otherwise be possible. There is in relation to "*c*" several purposes for which gas is utilized in which flame temperature is a factor of considerable importance; and it may also be said that there is scarcely a purpose for which bituminous coal is used for which a cheaper gas or coke could not be employed with greater advantage to user and the nation—including for the user labour-saving and enhanced efficiency, and for the nation the prevention of atmospheric pollution with all its attendant uneconomies, and the preservation of the valuable constituents of coal that are destroyed when it is ruthlessly used for the single purpose of heating. The supersession by gas or coke of the coal so burned would ensure an adequate recovery of bye-products, which is a matter in which the Reconstruction Committee of the Government should be concerned.

There is the question of the minimum pressure at which gas should be supplied. This is a difficulty. We have no sympathy with the old minimum pressures. They are out of gear with the times; and they are rarely to be found now where there is a well-planned distribution system, or one which has been kept up to date by the application of auxiliary means of supplementing and maintaining pressure. But there should be no increase of pressure beyond local current practice (which rarely has anything to do with the present prescribed minima) without post-war time is allowed for adjustment to the new condition. To raise the minimum pressure above current practice would, in a large number of cases, mean a considerable reconstruction of the canalization system or the installation of means of boosting. Reconstruction work can only be done piecemeal; and this takes time. During the war such work and pressure-raising plant installation have perforce had to be postponed, unless absolutely imperative for munitions work.

The National Gas Council will probably now find good use for the Special Committee they appointed in relation to the movements in fuel economy, power provision, and reconstruction; and the Institution of Gas Engineers and the Leeds University, for their Gas Components Committee. It is a pity the work of the latter is not further advanced, so that the results could be laid before the Board of Fuel Research. However, this reference by the Board of Trade gives the gas industry a fine opportunity for proving its fitness and willingness for taking a large part, through its varied service, in the national development to which all are looking forward.

Hackney Undue Preference Case.

THE case in which the Gas Light and Coke Company allege that the Hackney Borough Council show an "undue "preference" to electric power users in the supply of energy for lighting purposes—that is to say, to those who are permitted to use for lighting 20 p.ct. of the energy taken under the power tariff of 20s. per KW. per quarter of maximum power demand and ½d. per unit in addition—has been argued before Mr. Justice Astbury; and his Lordship's decision is now being awaited. Whatever the decision may be, there can be little question as to the case going forward to the Court of Appeal. From the Gas Company's point of view, the contractual condition as to lighting is nothing but a bait for custom, a disadvantage to competitors for the same custom, it constitutes a distinction, and confers, it is held, an undue preference, as against the manufacturer who needs a supply for lighting only and in favour of the manufacturer who requires a "corresponding supply" for lighting, *plus* a supply for power. It gives, too, an advantage in respect of lighting, so it is submitted, to those manufacturers whose power requirements are large, compared with those whose power requirements are small but whose lighting requirements are equally large, and whose excess of requirement for lighting beyond (over the 20 p.ct.) has to be paid for at a heavier rate. From the Hackney point of view, there is no undue preference in respect of lighting, because the power "circumstances" are not "similar." A great deal, of course, depends on whether "corresponding "supply" is intended to mean "corresponding" purpose, and, taken in conjunction with the words "similar circum-"stances," the Long Eaton case appears to warrant a very definite conclusion.

However, during the evidence, the load factor and the diversity factor were put up, and made much of, to show that the working of an electric generating station is vastly influenced by them. From the arguments the fact emerges with well-defined clearness that the incidence of the 20 p.ct. of cheap units must be on the peak of the ordinary lighting load, when all other lighting consumers would be paying more for their current than those fortunate manufacturers with the 20 p.ct. allowance. These men do not use the 20 p.ct. for lighting during the daytime, but at the same time that other consumers are using their units for a corresponding purpose. Much of the argument on the technical points would have had better place in the Parliamentary Committee Rooms than in the Law Courts. The latter have no concern with effects on generating stations; their concern in this particular matter is to see whether what is being done is an infringement of the existing law, or "undue "preference"—whether it confers something of a favourable nature upon one consumer over another for a "correspond-"ing supply." If so, then it is illegal. His Lordship incidentally asked, "Why cannot the undertaking give a better "rate to a man who takes a larger quantity of current than "to one who takes a smaller quantity?" We cannot see why not, provided that it is for a "corresponding" purpose. But does a power supply correspond to a lighting supply? If it did, it would be supplied at equal rates. But the rates widely diverge. The whole of the arguments in regard to load and diversity factors go to prove that the two supplies do not correspond; and therefore the inclusion of lighting units in power supply at power rates is a vitiating element. However, we are expecting to hear early this week what his Lordship thinks of the matter; and then probably, as remarked, steps will be taken by the side defeated in the first bout to carry the matter further.

The Chemist and the Gas Industry.

THE members of the Society of Chemical Industry, at their annual meeting last week under the Presidency of Mr. Charles Carpenter, D.Sc., must have drawn the conclusions from the general proceedings that the gas industry is at present much alive, and that it presents a vast and fertile territory for scientific and chemical workers. Indeed, some members of the Society whose working orbits are of a very restricted character must have been highly envious as they heard Mr. E. W. Smith treating of many aspects of the subject of the production of industrial gas, Mr. T. F. E. Rhead dealing with sources of benzene and toluene in which he showed that gas-works are one of the prolific sources, Mr. W. J. Pickering surveying the work done in relation to the calorific value of industrial gas, and Mr. C. M. Walter telling of the big scope there is for scientific and commercial work in connection with the developments of the industrial application of gas for heating purposes, in which paper was predicted the day when solid-fuel furnaces may, through the economic virtues of gas, become things of historic interest, though not of veneration, except as steps in the progress of industrial civilization. All these workers hailed from the stations of a single Gas Department—that of Birmingham. The papers were illustrative not only of the expanse that the gas industry offers the scientific worker, but of the stores of commercial development that are opening up to it, and the possibility of still more lying concealed until unearthed. This being so, is it to be wondered at that one who has lived in, and grown with, the gas industry as has the President should be impressed with the need for a revision of our educational system, in order that, at any rate, elementary chemistry may be taught as a matter of course, so that the seed that fall on good ground may fructify, and produce more chemists whose talents lie in the direction of research, and impart to men generally a sufficiency of knowledge of the subject to enable them to appreciate the value of the co-operation of science with practice?

To the want of the power of such appreciation through the neglect of early inculcation is attributable an enormous waste, an enormous loss of time, and the world has been jogging along far behind the advantages it might have enjoyed before if only it had worked as it should have done. What Mr. Carpenter urges is that opportunities for assisting to promote individual and collective betterment should be given to every brain, but by improved ways. The gas industry can endorse the suggestion and the reasoning; and what is true in respect of the gas industry is true of other industries. It is a strong indictment of a very grave neglect,

from which the gas industry cannot stand apart, when the President can speak of the unscientific development of the country's fuel resources, and when Mr. Smith can say, "There is a strong case for the Government or some com- "petent authority to set up a scientific and practical Com- "mittee, versed in the conditions of carbonization, to go "into the whole subject (even if at considerable cost) in an "independent manner, in order to settle it as far as is prac- "ticable at the present time." This was written before the reference by the Board of Trade to the Board of Fuel Research was promulgated. The reference, however, tells a tale of a prevailing indecision, which only scientific research can put right. The paper read by Mr. H. W. Rowell on co-operative research, in which he urged investigation by, among others, tar distillers, and that by Messrs. Walter C. Hancock and W. E. King on refractory materials both accentuate the work there is to be done in connection with coal carbonization and the resulting products which has not yet been done, but much of which might have been if there had not been such an ignorant evasion of opportunities. The same remark applies to the Gas Components Committee of the Institution of Gas Engineers, about the lines of whose work Mr. Smith gave some information. However, it is something to get such a large recognition of requirements; and, in the position to-day, there is much over which to be hopeful and confident.

Coalite Rumours and Speculation.

A time ago the British Coalite Company took unkindly to certain comments of ours about the repeated promises made as to the fulfilment of the technical and commercial success of their system—whatever the character of its organism and the method of its operation. If ever success is achieved, it will be through a long drawn-out comedy of errors, which prove an absolute inappreciation of essentials from the initial stages. Hope, real or otherwise, now rests on the results of the Barnsley Smokeless Fuel Company's plant—an offshoot of the British Coalite Company. In the letter published on Nov. 14 last, when the British Coalite Company sought by a singular effusion to reprimand us for our views, the promise was made that, in a few weeks or a few months, the plant at Barnsley would be at work; and then the revelations would make us regret our criticisms. There has been patient waiting; the disclosures of that plant are not yet forthcoming. But there has lately been some speculative buying of Coalite shares, on the strength of rumour that something or other valuable is going to divulge itself. That has been the intermittent rumour since (the late) Thomas Parker was granted his original patent eleven years ago. But every rumour has had its day; and the share speculators have found themselves poorer for their deal, and those with shares to part with better off than they were before. The best advice the public could accept is to refrain from speculation in Coalite promises until the results of the new plant have undergone independent and competent investigation, together with the commercial position.

Receding Low-Temperature Carbonization.

It is pretty clear that the system, if it can be so called, has been almost completely metamorphosed, and that it now possesses little of its original character, as covered by the specifications of Mr. Parker. It is now a design of slowly evolved ideas; and we think it will be found to have passed from what can be truly called low-temperature carbonization to something that is a greater distance on the road to the high-temperature process as practised in gas-works. If so, then the primary product will not be Coalite with a good percentage of volatile matter in it. There have been two recent publications in our columns which show that the fascination of real low-temperature carbonization is now fading away, through the disappointing results in the products themselves. Among those who have been making investigation into low-temperature carbonization is Mr. Robert Maclaurin, who has himself devised a system of working; and in his paper read before the Society of Chemical Industry [of which notice was made on July 10, p. 68] he gave results from his researches. These results have produced conviction in Mr. Maclaurin's mind that it is hopeless to look upon the low-temperature method for the purposes of making town gas; and that there will have to be a departure to a semi-high temperature method, which means a lessened amount of volatile matter in the coke, upon which the Coalite people have been relying as a distinctive feature and a recommendation over and above the gas-works variety. Then we have "Nemo" writing in last week's issue, and pointing out that the Barnsley Company's prospectus claims that their smokeless fuel will contain a "considerable percentage" of volatile matter, and "large volumes" of motor spirit, benzol, toluol, zylol, and carbolic and cresyllic acid or oils. "Nemo" pricks the very pretty bubble. One cannot have all these things from a true low-temperature process. He states the reasons. The scientific man conversant with the production of low-temperature oils or tars knows them; the public does not. "Considerable percentages" and "large volumes" may attract the lay man of a speculative turn of mind. It has attracted him before in connection with "Coalite;" but truth requires a modification of claims, and an admission that the path of actual low-temperature carbonization has been left for one that brings the "Coalite" system much nearer the temperatures now practised by gas-works. The self-appointed, dogmatic critics of, and prescribers of new carbonizing practices for, the gas industry, before they will again allow their sprightly tongues to wag, may perhaps consider the trend of knowledge and reform of carbonizing systems distinguished by the description "low temperature."

Gas Heating and Next Winter.

This ought to be a big gas-fire and gas-cooker fixing season for those who have the fires, the cookers, and the fitters. While the military authorities are, with heavy hand, whittling-down the fitting power of gas undertakings, the Coal Controller urges the public to use gas fires and cookers in order to save as much as possible coal distribution next winter (gas-works being expected to stock themselves well with coal against the winter's eventualities); the Ministry of Munitions urge the same course of procedure, in order to give more gas from which to extract the properties for the making of explosives and sulphate of ammonia; and in the food and home labour-saving campaigns, there is advocacy to the same effect. In short, there is a perfect deluge of recommendation all favourable to the gas-heating business; and the gas industry will do its level-best, in the retarding circumstances of the time, to make effective to the public the counsel of the various authorities. The difficulty of obtaining coal supplies last winter, together with its severity, has at any rate in some gas-supply areas made the public very desirous of having additional strings to their heating bow. From London districts and different parts of the country comes intelligence of local authorities with large institutions under their control ordering considerable numbers of gas-fires. This is all very well where there is a margin of coal-gas and water-gas manufacturing plant to take the flights of peak loads when the indications of the thermometer are travelling towards zero. There will be good use made from now onwards of the coal-economizing assistance of blue water-gas. Last winter saw many gas-works hard pressed, through their inability to obtain during the war sufficient material, labour, and plant for extensions, repair, or replacement. But nothing that can be done now should be left undone to satisfy the public, as this is all to the good for "after the war." Electric light users are found in places to be most anxious to have gas-cookers and gas-fires. This is a good field for the hire-purchase system. Personal possession means permanent custom.

Figures from Manchester.

The usual summary of the report of the Manchester Corporation Gas Committee on the operations of the past financial year, which appears in the news columns of this issue, shows that the gross profit is some £40,000 less than was the case a year ago, while, owing to the fact that £6000 odd more has had to be paid for interest on loans, &c., the net profit is down from £141,234 to £93,780. As before, the city fund receives £50,000 in aid of the rates; but whereas the deficit which was brought into the accounts amounted to £34,009, there is on this occasion an excess appropriation (including sinking fund contribution for redemption of loan debt) of £53,951 to be carried forward to next year's account. Turning to the works statistics, it is seen that the quantity of gas sold was something under 2½ p.ct. less than in the previous year. The estimated decrease arising from the operation of the Summer Time Act was equal to 1·8 p.ct. on the annual consumption; while the falling off in the quantity of gas supplied for the public lamps is calculated at just over 1¼ p.ct. on the

output. Not the least interesting feature of the Manchester gas accounts is the collection of statistics made by the Superintendent (Mr. Fredk. A. Price) by which they are always accompanied. The information furnished is of a very complete nature; though this year Mr. Price has succeeded in finding a new table which he could introduce. This gives for the past twenty years—the period covered by the tables generally—the quantities of gas transmitted from the works divided up into day and night consumption. It shows at a glance the progressive nature of the change that has been taking place over that time in the character of the demand. Whereas in 1898 the day consumption was 26·56 p.ct. of the total quantity of gas transmitted from the works, for the year ended March last the figure was 45·31 p.ct.

And Other Places.

The report on the working in the past year of the Birkenhead Corporation gas undertaking indicates that a very substantial decrease in the consumption during the first three quarters of the year was nearly made good by the gain in output experienced during the final three months. Points to which the Engineer is able to draw special attention are the make of gas per ton and the coke sold per ton of coal—both of which constitute a record for the works. Over 12,000 tons more coal was used, because for five months the carburetted water-gas plant was left altogether out of operation, so as to economize oil and coke. It is stated in the report that, in the matter of cooking-stoves, Birkenhead is approaching saturation-point in proportion to the number of consumers, and that it is from fires and hot-water apparatus that future increases must come. The results of an examination (by a correspondent) of the accounts and statistics of the Dundee gas undertaking are set out so as to reveal the gratifying progress that has been made over a period of years. Stourbridge has to report a decrease in the sale of gas, through both ordinary and prepayment meters, as well as for public lighting. So far, at any rate, as private consumers are concerned, the falling off is attributed largely to the operation of the Summer Time Act.

A Union of Manufacturers

For the purpose of undertaking kinds of work the need for which is daily becoming more widely acknowledged, there has been registered as a company limited by guarantee, and not formed for the purposes of profit, the Incorporated National Union of Manufacturers. The number of members is unlimited; and the management is vested in an Executive Council, a published list of the first members of which includes, among a wide range of industries, Mr. F. M'Leod, the Secretary of the South Metropolitan Gas Company, and Mr. D. D. Macpherson, of the Gandy Belt Manufacturing Company. For the guidance of any other "JOURNAL" readers who may consider the advisability of joining this new Union, it may be stated that the objects set forth are to undertake any of the liabilities and assets of the British Manufacturers' Association, 1915; to promote the home, colonial, and foreign trades and industries of the United Kingdom; to encourage free intercourse between masters and workmen; to render pecuniary, legal, and other assistance to small essential industries (other than members of the Association) in case of need; and to collect and disseminate statistical and other information. In all the directions named there must be ample scope for the exercise of useful effort; and the larger the membership roll of the Union, the greater will be the power behind these efforts.

The Gas Light and Coke Company's Dividend.

The Secretary of the Gas Light and Coke Company (Mr. W. Beckford Long) announces that, subject to audit, the Directors of the Company have declared a dividend on the ordinary stock for the past half year at the statutory rate of £3 14s. 8d. p.ct. per annum. [Under their Act which, as intimated in last week's issue, has just received the Royal Assent, the Company are empowered to hold annual, instead of half-yearly, meetings of the proprietors; and advantage will be taken of this provision to meet only in the early part of each year.]

Calorific Standard Orders.—The Local Government Board have made Orders under the Gas (Standard of Calorific Power) Act, 1916, for the City of Birmingham, the Shipley Urban District Council, and the Borough of Southport. In each case the standard calorific power is 500 B.Th.U. gross.

COAL GAS (NOT WATER GAS) TO BE MADE.

Referring to the appeal recently issued to the gas industry by the Controller of Coal Mines, urging the substitution of water-gas for coal-gas to the greatest practical extent, with a view to effecting coal economy, it was last night officially announced that certain factors have since arisen which require a reversal of this policy; and with a view to securing the maximum quantity of coal-tar products, the Minister of Munitions urges that all carbonizing plants at gas-works be worked to the fullest extent, before any water-gas at all, carburetted or uncarburetted, is manufactured. The Controller of Coal Mines, who is aware of the altered circumstances, will co-operate with the Ministry of Munitions in this matter, and will give instructions for all necessary coal to be delivered to gas-works for carbonizing purposes.

QUALITY AND PRESSURE OF GAS SUPPLY.

Board of Trade Action.

ON Thursday last the Board of Trade issued to the Press the following announcement:

Various questions of a technical character having recently arisen relating to the supply of gas, the Fuel Research Board have undertaken, at the request of the Board of Trade and other Government Departments concerned, to conduct an investigation and to advise them as to the most suitable composition and quality of gas and the minimum pressure at which it should be generally supplied—having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used.

PERSONAL.

A note in the "Croydon Co-Partner" states that Captain W. H. TOPLEY, the Editor, has been wounded. Happily, however, he himself describes the injury as not serious.

The Council of the Royal Society of Arts, at their first meeting for the new session, elected as their Chairman for the ensuing year Mr. ALAN A. CAMPBELL SWINTON, F.R.S., in succession to Mr. Dugald Clerk, D.Sc.

At a meeting last Wednesday of the Council of the Leeds University, Mr. JAMES W. WOOD, M.Sc., was appointed Research Chemist in the Fuel Industries Department, to work under the direction of a Joint Committee of the University and the Institution of Gas Engineers.

Mr. GEORGE KEILLOR, Assistant Gas Manager at Dundee, has been appointed Engineer and Manager at Greenock. He is 43 years of age, and prior to the amalgamation of Broughty Ferry with Dundee was Gas Manager at the former place. On completing his education, he entered the service of the Nairn Gas Company, under his father, who was Engineer and Manager, and after three years' training was appointed Assistant Gas Manager at Hamilton, where he remained for five years. In 1899, he was chosen to be General Manager, Collector, and Inspector of Light to the Corporation of Peterhead, and in 1903 was appointed to Broughty Ferry.

CITY AND GUILDS EXAMINATION PASSES.

More Successful Candidates.

[See also *ante*, pp. 15, 59, 101.]

Gas Engineering.

FINAL GRADE—SECOND CLASS.

Niels Skovgaard, of Manchester.

GRADE I.—FIRST CLASS.

G. W. Morris, of Wakefield.

GRADE I.—SECOND CLASS.

A. Dyer, of Wombwell.
C. Wadsworth, of Wombwell.

Gas Supply.

FINAL GRADE—FIRST CLASS.

Niels Skovgaard, of Manchester.

The members of the Yorkshire Junior Gas Association have been invited to visit next Saturday the new works of the Longwood and Slaithwaite Gas Company, which will afford them an opportunity of inspecting the continuous vertical retort installation in operation there (on the "Dempster-Toogood" system), also the coal and coke handling plant, the gas compressors, &c.

ELECTRICITY SUPPLY MEMORANDA.

The question of tariffs for electrical energy has been revived by the "Electrical Review." It has had a long rest from discussion, except in council chambers and committee and board rooms, where tariffs have been moved up, revised, and some of them shorn of their peculiar embroidery, and so simplified. Whenever the subject is reopened in the electrical papers, attention is arrested, in order to see what (if any) new proposal has been conceived; for there has never been a commodity, while being credited with so much intrinsic merit by its purveyors, that has had so many and such widely diversified methods of charging applied to it with the view to induce the public to purchase, nor the prices for which are, according to use, so far removed the one from the other. The amount of inventive faculty that has been brought to bear has been as great a marvel as the character of some of the tariffs, and the infinitesimal results in actual business in certain lines have been no less so. Time was when in the construction of tariffs there was some semblance to a scientific basis. But one by one the electrical purveyors, in their construction and adoption of tariffs, have dropped from the boasted high road of scientific rectitude down to a low level of crudity, which they can only justify by the old and convenient excuse of commercial expediency. This is a further proof of the difficulties of their advance in certain lines of business without recourse to something that is innocent of all those factors that should be taken into account in fixing the price of a commodity. Cost of production, capital and establishment charges, and all else are juggled with just as requirement needs. The attempt is to make the prices fit—and it is generally a misfit—the business sought, and not an endeavour to gain the business upon sound and defendable charges. Never has an industry been so unfaithful to business and scientific principles as has been the electricity industry in this matter of tariffs.

From the Path of Virtuous Tariffs.

There is the rateable value system, under which a lump sum is charged on the rateable value of a house, and so much per unit beyond—½d., ¾d., and perhaps in some cases to-day 1d. No one tries to defend this system from the equity point of view. If one dared, there are many glaring examples of its inequity. The very basis of the lump charge has no connection with cost of production, and capital, distribution, and other outgoings. A man under it may not use a pennyworth of current in the day time. His maximum demand may come on the peak load in the lighting hours, and yet the total of his consumption may not be any more than that of a consumer whose demand is spread over the day time as well as the earlier hours of darkness. The rateable value of a house that has "seen better days" may be low; the rateable value of the modern house (no larger in size) in the next street may be considerably more. The total consumption of the two houses may be the same. The former house gets its supply on the average cheaper than the latter, and thus enjoys preferential terms. One man on the rateable value system whose consumption is for lighting only may, through the operation of the system, get his lighting units much cheaper than another man. He likewise is favoured with the equivalent of a preferential charge. The allegation as to a defective foundation could, if necessary, be emphasized by the calling to witness of no end of such illustrations. Papers, too, have been read which show a considerable enlargement of consumption with total revenue that has not reached anything like that which previously obtained for a smaller business on a flat-rate.

Effects of a Wrong Basis.

The American electricity suppliers are discussing the simplification of their tariffs. And there is room for it. The "Electrical Review" thinks so; and it takes the occasion to admit that the rateable value system adopted by the British electric supply industry may not be "scientifically correct;" but it defends it thus—

An "Abstract Assessment" and a "Complex Average."

> When we consider that the cost of a KW.-hour supplied to a particular consumer depends on the distance and method of delivery, the time at which, and during which it is delivered—*i.e.*, the effect on the generating plant of the incidence of its delivery as regards the supply of energy to other consumers—as well as on the degree of efficiency of the generating plant, and sundry other lesser technical and operating considerations which, though pregnant with significance to the engineer, are as Greek to the consumer, and that the tariff has to perform the dual function of embodying the complex desires of the former in the simplest possible form which will appeal to the non-technical imagination of the latter, it will be obvious that it must in every case, irrespective of its simplicity or complexity, be an abstract assessment of value of service, based on a complex average.

This long-winded explanation is in its tail-end about as clear as ditch water. "An abstract assessment of value of service based on a complex average!" This in these days when we are all talking of the alliance of science and business! And this the best that can be said in defence of the rateable value system! Is a system of payment for electricity (the cost of which can, if desired, be definitely computed) that is founded upon such an extraneous factor as the rateable value of premises, truly described as an "abstract assessment of value of service based upon a complex average"? If nothing better than that can be said for it when every examination discloses the defects which subscribe to inequity as between house and house, consumer and consumer, use and use, then our electrical friends had better give up the task of trying to justify it, other than on the ground that they have to utilize a vitiated system, or resign all hope of getting business for domestic purposes other than lighting in view of the value offered by competitors, with simply constructed and relatively inexpensive appliances. This is the truth of the matter, which the "Review" secretes under that blanket of words, "abstract assessment of value of service based upon a complex average." We like this blanket, because of the confession we find reposing in it. When, too, an electrical consumer asks the electrical canvasser, or the gas man, "What is the rateable value system?" and he hears that it is an "abstract assessment of value based upon a complex average," he will no doubt be a happier man for the information.

Purchasing Co-operation of Residents.

The "Review" later in the article speculates, and makes a suggestion. "The prospect of developing the heating and cooking load looms so very largely in the future, that one is tempted to speculate as to the ways and means of hastening it." It suggests co-operation of the residents in a street. "If 75 p.ct. of the householders in a street containing (say) 100 houses were to combine and co-operatively purchase energy in bulk for resale at cost price to themselves from the supply authority, at the same time guaranteeing a certain average wattage of heating and cooking apparatus installed, this group of consumers would progress electrically at a much greater rate than the average consumer throughout the area." Why 75 p.ct.? The remaining 25 per cent., we take it, is to cover undesirables and empties. Did anyone ever hear of such a queer business proposition? Who of the 75 p.ct. would make himself responsible for the payment by his neighbours? We question, too, whether such a scheme could claim any legal authority. To whom would the distributing cables and appliances belong? Who would be the distributors in the eyes of the law? Who would be responsible for taking action to recover payment? "Any improvement brought about by this progressive group of consumers would be reflected in a reduction of charges to them, thus tending to still further development." To justify the preferential treatment, the supply undertaking would have to regard the whole of these co-operators as one consumer, and deal only with one. What under the existing law would be the position of the supply undertaking if a man in the street, declining to be one of the co-operating 75, went to the legal supply authority and said: "I want my current for lighting, for cooking, and for heating at the same prices as my next-door neighbour, who is one of the 75. My consumption for those purposes will be equal in amount to his?" The "Review" is really charmed with the cleverness of its own invention. Its advocacy unblushingly acknowledges that it is based on the doctrine of preferential treatment as a reward. It says: "In effect such a scheme would sort-out the good consumers from the bad and indifferent, *rewarding them as a class according to their merits*, and intensify and hasten on the domestic use of electricity and electrical appliances among those sections of the community most suited for the purpose. . . . Whereas it is impracticable to apply intensive development on a scale suited to a whole city, it is reasonable to assume that such development is possible *in the case of a selected section of the community*." The electrical industry has given birth to numerous schemes that have had a brief undeveloped life, and secret burial. Probably here we have another which will shortly require similar accommodation.

The Unhappy Board of Trade Move.

According to a resolution passed by the Bristol Corporation Electricity Committee, the Board of Trade's recent appointment of additional members of the Electric Power Supply Committee to represent municipal interests altogether ignored the Incorporated Municipal Electrical Association; in fact, that organization was not even invited to nominate a member. Perhaps the Board of Trade do not hold the Association in very high esteem. The Bristol Committee suggest that the Board be again requested to appoint one or two members recommended by the Association, "so that the technical side of the municipal case can be adequately represented." Mr. H. Faraday Proctor, the Electrical Engineer at Bristol, is Hon. Secretary of the Association; and this probably accounts for Bristol meddling in the matter. If protest had to be made, it should properly have come from the Association as a body. We do not know the date when the resolution was passed; but anyway the technical men on the Board of Trade Committee will not regard it as a compliment that they cannot adequately represent the technical side of the municipal case. Does this apply to Mr. Harold Dickinson, the Electrical Engineer of Liverpool? However, the Bristol Committee have the interests of the Association so much at heart that they decided to send their Chairman, one other member, and their Engineer to interview members of Parliament on the subject. We suppose this has been done; and that this is partly responsible for the recent heckling of the Board of Trade in Parliament. If not, then there may be still more in store for that much tormented department. At the same time, the Electricity Committee of the Hammersmith Borough Council are circularizing other electricity

committees, urging them to combine for the purpose of "demanding" (this sounds a bit impertinent when dealing with a Government Department) that the Board of Trade Committee should be dissolved, and that a small number of "competent unbiased persons not directly interested in electrical matters should be constituted in lieu thereof." The members of the Board of Trade Committee must possess a good dermal covering, or they would have shaken the dust of Whitehall off their feet long since, and have refused to return.

Further Proposals for Legislative Reforms.

The Association of Municipal Corporations is not often heard of in connection with electrical affairs; but the members of the Council have awakened to a series of legislative matters upon which they think there should be reform. The appointment of the Board of Trade Committee on Electricity Supply has stimulated ideas. The section of the Act of 1888 giving to a local authority a provisional veto is not, in the opinion of the Council, suitable to current conditions; and a reasonable modification of the terms of the section should be assented to. The provision giving local authorities the power of purchase also calls for consideration, as affecting the position of local authorities supplying energy outside their municipal boundaries. Where this has been authorized, the purchase by an outside local authority of the part of the undertaking in its area, would, it is submitted, undo the work done in the way of reducing the cost of supply through increased and diverse demand, and consumers throughout the whole area would suffer in consequence. It is suggested, therefore, that it should be no longer obligatory to apply to undertakings authorized by Provisional Orders the provisions of the Electric Lighting Act, 1888, as to purchase. Where, however, rights of purchase already exist, there should not be interference, except upon agreed terms. Relating to the promotion of Provisional Orders, notices to local authorities of intended applications, unless waived, are liable to cause the loss of a year in obtaining statutory powers, and constitute, therefore, a hindrance to the extended supply of electricity. The Council recommend that the provisions should be repealed. Another step to be taken to ensure a cheaper supply of electricity would be to encourage and facilitate the linking-up of two or more generating stations in neighbouring areas. Suggestions have been put forward from time to time with reference to uniting in one department the electrical functions now performed by various Government Departments. While agreeing that some advantage would probably be derived from uniting the several powers in the hands of one department, the Council are doubtful whether the scheme would prove altogether practicable. They further think that the disadvantages attaching to the setting-up of any fresh Government Department would outweigh any advantages there may be. At the same time, they think that it would be well to strengthen the technical side of the Board of Trade. If any changes are made, they hope that nothing will be done to relieve the departments of their responsibility to Parliament. Regarding the first three matters dealt with in the report, Parliament will look very narrowly into any suggested alterations of general legislation before conceding them, more especially if the same legislation applies to any other industry. As to the last matter, no one need trouble. The departments concerned will see that they are not shorn of any power that they themselves value.

Calorific Standard in Indiana.—The Indiana (U.S.) Gas Association have filed a petition with the Public Service Commission asking that the caloric standard for artificial gas, previously fixed by the Commission at 600 B.Th.U., be lowered to 550. The petition covers 29 companies operating in Indiana, and sets forth that, on account of the scarcity of gas-making materials, it it practically impossible to produce gas which will come up to a 600 B.Th.U. standard, regardless of the exceptionally high cost of such material. The petition also points out that in 1913, the Association requested that the standard be fixed at a lower point, and the Commission replied that the 600 B.Th.U. standard was understood to be tentative, and that the question would be reopened at some future time after the gas companies had made an effort to maintain the standard then established.

Chemical Industry of Japan.—One of the most remarkable features of the economic development of Japan, says the "British Trade Review," is her extraordinary progress in the chemical industry. At the commencement of the war this industry was still in its infancy; yet to-day Japan is exporting chemical products for the supply of which she was but three years ago almost entirely dependent upon outside sources. Among many other things, Japan is making sulphate of ammonia from the bye-products of the gas and coke factories and from nitrogenous lime. The Tokyo Gas Company are making carbolic acid; and the Japan Dyestuff Company have laid plans for manufacturing it from benzol. The yearly production of sulphuric acid in Japan is little short of 750,000 tons; and it is intended to establish plant for the production of this acid by the contact process. As to the dyestuffs industry, the Japan Dyestuffs Manufacturing Company has been founded, and is backed by the Government. Before the war Japan imported from Germany coal-tar colours to the value of something approaching a million pounds sterling; and, although the Japanese industry is still in its infancy, it is clear that Japan does not intend to go on paying such a tribute to Germany.

THE INSTITUTION OF GAS ENGINEERS.

AFTER THE MEETING.

By NORTON H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

YEARS go by, members assemble at the annual meetings, shake hands, sit out the programme, and separate for another year, probably with mutual congratulations on having held a good meeting. But are we to assume that a muster of 25 p.ct. or so of the total membership necessarily carries such a conclusion? A popular President can guarantee as much without any other attraction.

Whether it is a "good" meeting in a fuller sense, as having been attended with adequate progress according to the needs and new conditions of the times, is open to question. A good meeting comprises something more than a dreary sitting out of the proceedings in the meeting, varied occasionally by a convivial smoke with a crony in the lobby outside. Evidence is to be sought for not only in the direction of something attempted, but also of something done, for the general advancement of the profession or the industry, according to individual ideas of how much, or how little, the Institution is supposed to represent, and to the efficient accomplishment of well-considered designs to this end. But the progress during the last forty years—with the one exception of the formation of the British Commercial Gas Association—has been more on the lines of suggestion and indefinite speculation than of active work; and in this wider sense, the "good" meetings are few and far between. Each succeeding President seems impressed with the fact that the Institution has not risen to the occasion, and offers various ideas as to extension and improvement. The need for decisive and representative action increases year by year, and is greatly accentuated by special war conditions. But the chief features have been, and yet are, uncertainty and indefiniteness of aim. Surely it is time that questions such as "should the membership and scope of operations be extended, so that the Institution may become fully representative of the gas industry rather than the gas engineer?" or "is a gas building required; and, if so, how are the necessary funds to be raised," or "would an experimental gas-works be an advantage, and how can the use of one be secured," should no longer be treated as of the "gigantic gooseberry" class, but be definitely settled once and for all.

Judging from the proceedings at the recent meeting, a home for which was provided by the courtesy of the Institution of Civil Engineers, the members as a body cannot be accused of undue verbosity, notwithstanding the numerous problems by which they are to-day confronted. Some 260 out of a total of 870 devoted the greater part of a day to hearing the proceedings; but excluding purely formal business and the remarks offered by non-members, the number of speakers from the body of the hall did not exceed a dozen, including those who merely put short questions. Possibly the issue of reply circulars, such as those referring to the life of meters, may have exhausted informative powers, though the annual report, including proceedings of Special Committees, covered many items in respect to which a goodly number among the 260 might be expected to have something to say. The limited time at disposal may also be a contributing cause. But the chief item was an obvious unwillingness, not peculiar to this meeting, to take too much licence in the discussion of department reports. Frequently these include matter that would not pass unchallenged if presented in the form of a paper. Complimentary agreement is to a large extent superfluous, and an adverse critic does not receive much patience from the body of the hall, where he is evidently regarded as a sort of Adullamite. Yet surely some of the 90 p.ct. or more of the members who contribute nothing towards the proceedings, and whose voices have not been heard in the meeting room, are capable of supplementing some of the information from their own personal experience. To meet the needs of those who are "unaccustomed to public speaking," or not present, written comments or addenda might be invited, to be included in the published reports. It is doubtful whether much response would be forthcoming, as the majority appear to accept the Committee reports as sharing in the courtesy customarily extended to inaugural addresses.

One may be reminded that the stress of war conditions does not leave much leisure for the preparation of communications, or thinking out discussions, and that if papers were submitted they might not be adequately discussed. But why should the Institution be exceptionally situated in this respect? The District or Junior Gas Associations, or the Commercial Sections, are able to maintain a normal standard. It seems that the department report has entirely displaced the time honoured paper and discussion, hitherto accepted as the best method of disseminating technical information among the members, which is a leading item in the objects of the Institution; and if we deprecate the paper and discussion as not a great loss, we get near to the suggestion that the members are not capable of originating or considering matters of general interest and importance to the profession, and to questions affecting the practical utility of attending meetings.

The time when the "engineer and manager" stood as the representative of the whole technical staff, and when some justification existed for the supposition that an association composed exclusively of such could claim to cover the whole department, has long since gone by. But even in the earliest days of the British

Association of Gas Managers, the need or advantage of lectures or papers from non-members became an important feature in the proceedings; and why should we assume that a gentleman who, by reason of education or employment, is able to present a valuable contribution to the proceedings, would not in a general way be an acquisition to the roll of membership? In many directions he would be capable of bringing in vitality and influence of a character that are outside the capabilities of a manager.

As the industry expands, the manager tends to become more of an organizer and less a technical specialist. This drifts towards the heads of departments, who are closer in touch with details than the so-called head. The manager has long ago ceased to cover the whole technical department with his own hat, but depends on the works foreman, the distribution superintendent, the sales superintendent, and others with technical knowledge in their special department exceeding his own. Many of them, being younger men, have enjoyed educational advantages that have only come into existence within the last twenty years. Men who would be a great assistance to the objects of the Institution (in the narrow sense) have been left to form independent Associations, and incidentally have shown that they are capable of providing papers that, in respect to interest and informative quality, are quite equal to anything that has been put before the Institution. The District Associations, though now affiliated to the Institution, were allowed to go their own pace for so long a time that they retain their distinctive characteristics, especially in regard to the Commercial Sections. One might go on to mention the Gas Companies' Protection Association, the Sulphate of Ammonia Committee, the London Coke Committee, &c.

Now and again the weaknesses due to lack of homogeneity become evident, and lately we have an endeavour to meet the need by the appointment of a National Council, at which all may be represented. What advantage is gained by so many different bodies, which must unavoidably overlap and clash in some respects? The membership must be drawn from the same sources, and it is impossible for one individual to take a living interest in, to attend meetings, or share in the proceedings of, half-a-dozen Associations; and the success or otherwise of each body becomes dependent upon two or three leading individuals. If this is an advantage, the average member becomes simply a man of straw. And is it sufficient to outset the very obvious disadvantage due to lack of prompt representative influence and united effort? The old proverb about the bundle of sticks still holds good.

RATIONAL UTILIZATION OF FUELS.

In the current issue of the "Journal of the Society of Chemical Industry" an abstract appears of an article by N. Caro in the "Chemiker Zeitung," Vol. XLI., pp. 393-5.

The abstractor writes: The rational utilization of fuel has excited much attention in Germany recently—especially in connection with the proposals for the taxation of fuel and electrical power. In some quarters, the carbonization or gasification of the whole of the coal used is advocated, with prohibition of the combustion of raw coal. For many purposes the latter can be regarded as an unnecessary and old-fashioned process, while the former, by reason of the bye-products obtainable and the hygienic and other advantages which follow, should certainly be widely developed, in the interests of true national economy. A note of caution, however, is sounded against rash generalizations from special cases which are frequently current. If all the coal were carbonized or gasified, the production of bye-products would exceed any demand that can be anticipated at present. After the war there will be available large supplies of synthetic nitrogen compounds, which will inevitably prevent the maintenance of the price of ammonia at the pre-war level.

The question of the rational utilization of fuel is to be studied from an economic standpoint. There are cases where, on this ground, the direct combustion of coal is preferable and more economical in fuel than gasification or carbonization. In carbonization there is a thermal loss of 10 to 15 p.ct.; in simple gasification, of 15 to 20 p.ct.; and in gasification for bye-products using steam, the loss may rise to 30 to 50 p.ct. These losses must be reckoned with in comparing the thermal efficiency of methods of utilizing coal. As a result, the fuel consumption in raising steam or heating certain furnaces may be increased by substituting gas-firing for coal-firing. Nevertheless there are numerous cases where gas-firing shows such marked superiority in the performance of a particular operation or sometimes an exceptional thermal efficiency, that this heat loss in gasification becomes of quite minor importance.

Thus where cleanliness of operation is essential, or where high temperatures must be developed, or where the grade of fuel is unusually low, gas-firing may be preferable. For boiler-firing these factors are inoperative; and no economy of fuel is normally effected by previous gasification of the coal. Owing to the greater heat loss in the producer, gasification with bye-product recovery leads to still smaller thermal efficiency in heating operations, and then the choice is decided by the value of the bye-products—a very uncertain factor, perhaps, in the near future. This and the lack of a supply of suitable cheap coal has militated against the development of the Mond gas process in Germany though it has established itself in a few places under specially favourable conditions. Even in England (South Staffordshire), where conditions are exceptionally favourable, the central generation and distribution of Mond gas made only slow progress for many years.

The gas-engine is thermally more efficient than any form of steam-engine; so that fuel economy can be effected by gasification of the coal combined with the use of the gas-engine as prime mover. This economy can be increased by using the exhaust gases from the engine in the producer, when the thermal efficiency of the latter rises to 80 to 85 p.ct. (with bye-product recovery). Unfortunately, the capital cost of the gas-engine is so high, and its flexibility under load so low, that it cannot for the present compete favourably with the steam-turbine for power production. This may be changed in the future, more especially if the problem of the gas-turbine is solved.

The author concludes that no saving of fuel will be achieved by central gasification; and, in view of the possibility of fuel taxation, proposals to carry this out at the present time are premature. He regards it as preferable to allow the question of gasification of fuel prior to burning to be decided by the unfettered judgment of industry following its normal technical development. The expenditure of heat in carbonization is less than in gasification; and to that extent it can contribute more to fuel economy. Furthermore, the range of bye-products is greater. Wherever circumstances (technical and economic) permit, national economy will be promoted by this treatment of coal. It must be remembered, however, that low-temperature carbonization, liquefaction of coal under pressure by means of oxidizing and reducing agents, and the physical and chemical treatment of coal, may possibly bring in the future new methods of utilizing fuels which can be advantageously adopted in the interests of national economy.

A NOVEL GAS BILL CHART.

The American "Gas Age" say they have received from Mr. W. F. Schaphorst, of New York, something new in graphical estimation of how much the gas bill would be without doing any figuring. The following explanation of the suggestion is given.

No matter what the rate per 1000 c.ft., and no matter what the number of cubic feet up to 10,000, the chart will estimate the amount pretty closely. It is not as accurate as a mechanical multiplying or dividing machine, or anything like it; but it is a "gas-computing device" that has been reduced to a simple operation.

For example, what would be the bill for 800 c.ft. of gas at 80 c. per 1000 c.ft.? Find the 800 (Column B), and then find the 80 (also Column B). Now find the point that is exactly halfway between them. That is easily done by simply folding a strip of paper. Place one end of the strip on 800, the strip being on the "Cost of Gas" side of the scale; then fold this end back to 80, and crease the fold. At this crease will be found the cost of the gas used. It will be noted that the "Cost of Gas" scale condenses as the amount increases, and that the cost in the problem is halfway between 60 and 70, but that the decreasing scale makes this 64 instead of 65 [0·800×80=64]. Or, if you have a pair of dividers or a ruler, the halfway point can be found in that way. The strip-of-paper method is the quicker, and is highly accurate.

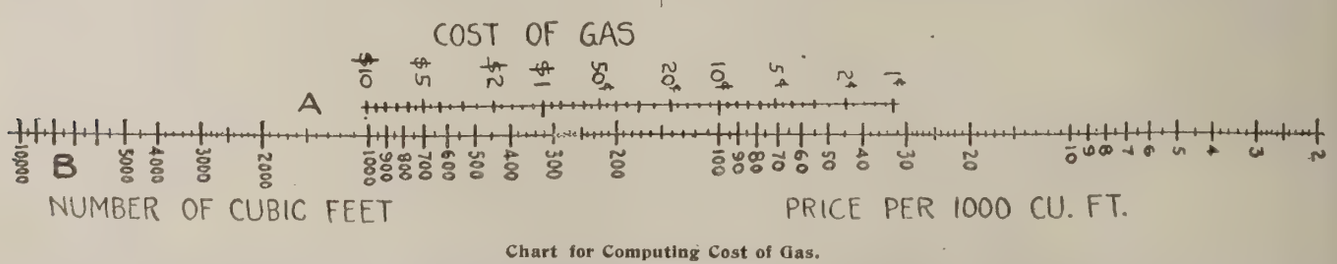


Chart for Computing Cost of Gas.

Dividend of the Tottenham District Light, Heat, and Power Company.—The Directors recommend payment for the half year to June 30 last of 5 p.ct. per annum on the consolidated preference stock, and of the full statutory dividends of 5½ p.ct. per annum on the "A" consolidated stock and 4 p.ct. per annum on the "B" consolidated stock—all less income-tax. A year ago the dividends were: On the preference stock, at the rate of 5 p.ct. per annum; on the "A" stock, at the rate of 7⅛ p.ct. per annum; and on the "B" stock, at the rate of 5⅝ p.ct. per annum—so there is a better return on the present occasion.

SOCIETY OF CHEMICAL INDUSTRY.

Annual Meeting in Birmingham.

THE Annual General Meeting of the Society of Chemical Industry, which was held in Birmingham on Wednesday, Thursday, and Friday of last week, took the form of a congress on the progress of chemical industry and applied chemistry. The whole of Thursday morning was devoted to a discussion of various aspects of gas supply; but a number of other matters of more or less direct interest to the gas industry also came under notice. Mr. CHARLES CARPENTER, D.Sc., the President of the Society, was in the chair throughout the meeting.

A WELCOME.

On the first day, the Society were welcomed by the Right Hon. the Lord Mayor of Birmingham (Alderman A. D. Brooks).

The LORD MAYOR, after recalling the fact that the Society had met in Birmingham on a previous occasion—in 1907—drew attention to the necessity for every man, whatever his attainments, to place his abilities at the service of the State in the present crisis. He gathered that one of the objects of the meeting was to see how far chemists could assist in the prosecution of the war, as well as to consider how they might be able to help the country in the days after the war. For the time being chemists were concerned in seeing how far they could destroy human life; but the experience would be of enormous advantage after the war. They had the means and the ability of preserving and making use of the knowledge thus gained for the benefit of the nation. Many industries which had temporarily been suspended would have to be re-established; and in order to conduct the national and commercial affairs on sound and economical lines, every use would have to be made of the scientific and technical methods available. Many industries in Birmingham depended largely for their success on the recovery of what in the past had been termed waste products. A great deal had been done in this direction, but still more remained to be done. There were, for instance, certain kinds of coal which it was not profitable to use in the ordinary sense, but which might be made profitable use of if chemical methods were applied. Again, there was, in a centre like Birmingham, a large amount of waste heat passing up the chimneys and into the air, which might be recovered. These were directions in which they would have to build afresh the national prosperity. In Birmingham, there were large municipal gas and electricity undertakings, in which considerable progress had been made by the application of scientific methods. In addition, there were the various mannfacturers; and he was sure Birmingham would watch with considerable interest the results of the meetings.

PRESIDENTIAL ADDRESS.

Mr. CARPENTER, in the course of his address, said: We meet to-day in a city renowned as being essentially material and practical in its character. It would not, indeed, require a great stretch of the imagination to look upon this gathering as a pilgrimage to the shrine which will ever be associated with the memory of two famous men—the discoverer of oxygen, and the inventor of the modern steam-engine. The mechanical engineer will not be likely to dispute the influence of Watt, nor will the analytical chemist be likely to deny indebtedness to Priestley. It is true, our present-day vision of the future is not quite the same as that which illuminated the minds of these two great men. But the steam-engine the one designed is just as essential an adjunct of the modern power plant as is the chemistry practised by the other to the modern synthethizer of new substances.

With the future of our Empire is closely bound-up progress in applied science, and of a certainty, chemical science; and this progress is impossible of achievement without the complete and sympathetic collaboration of both chemist and engineer. With one or two notable exceptions, this was not recognized to the full by many manufacturers in this country certainly until recently. The progress of the chemical industry requires the inspiration of the chemist in all possible directions. This, of course, goes without saying; but what I do urge is that the greatest possible advantage be taken of the engineer's particular gifts to bring about its achievement, once he is made to understand the conditions to be aimed at. The task may not be an easy one, for the temperaments of the chemist and the engineer are dissimilar, and the best examples of both are rarely met with in the same individual. The sorting-out process should begin at school. It should not be left to chance for the lad whose natural bent is along either of two paths, to make his choice of one. If the teaching authority has properly guided and taken pains, it should be an easy task to sift the pupil's leanings and direct his course in accordance with them. As a preliminary step towards this, the first principles of experimental science should be compulsorily taught in primary schools, as, for instance, is drawing.

Fortunately, the task of those who are endeavouring to push science into the forefront of our educational system is made simpler to-day by the fact that we have no longer to argue the necessity—I might almost say the paramount necessity—of the chemical industries to the nation. But how are we to take full advantage of the latent capacity of our youth unless we teach one and all that the pursuit of chemical knowledge is a calling as honourable and praiseworthy as that of any other of the professions? We have all, I expect, come across men with a strong, natural interest and ability for chemical pursuits which they followed by the merest chance, and not as a matter of course. Their rising to important positions in the chemical industry should have been by design rather than by accident. Here is one of the cases where the community require, and is entitled to have, the help of the State. Our educational system needs alteration at its foundations. In my opinion, a boy is old enough to learn science when he is old enough to learn history and geography. When a boy reaches the age of sixteen he should commence work either at the desk or in the factory, with compulsory attendance at continuation schools. After two or three years he will, if showing himself to possess the necessary ability, be fit for entrance to the University, to follow a further course of study along paths adapted to his temperament and qualities.

In coming into contact with men holding important positions in this country, I have been struck with the remarkable fact that, although they have been qualified to deal with affairs—they have been responsible for building-up large businesses, they have been responsible for controlling large organizations, they have played important parts in the government of the country—they overlook the enormously important fact that the bulk of the country is after all made up of the working classes, and they have not the slightest idea how to manage and deal with them. The fault is because they have had no opportunity in their early training for getting into close and personal contact with the men; and I think this can best be done in the early stages of a lad's life. I think that at sixteen a lad is perfectly ripe to receive the impressions of humanity which are going to be of importance to him in the future, whether he is to be a control chemist, a manager of a works, a member of Parliament, or even in the Cabinet.

In the past, the nation's youth has been developed as unscientifically as its fuel resources. We have seen enough during these last three years to realize that our future depends upon the highest development of our industries, and in which the whole populace must be trained to take its share as a pleasure no less than as a necessity. The taunt that we were a "nation of shopkeepers" was fast becoming a fact when our rude awakening came a century later. If we ever deserve another such rousing, our sleep will prove eternal. There were doubtless many contributory causes; but the plight of chemical industry in this country was principally due to the fact that so small a part of the nation was taught its language. The nation cannot be expected to appreciate science at its true value unless the appreciation is inculcated as thoroughly as patriotism, for instance. It must be remembered that the industrial chemistry of to-day is not largely a matter of pots and pans, but a highly complex combination in which temperatures and pressures of fine gradations and extended limits play important parts. The more one sees of this position, the more imperative does it appear that the chemist and the engineer should get into double harness as quickly as possible—the very faults of each make him indispensable to the other. The chemical industry teems with examples where the collaboration of both has been successful in extending its fields of usefulness. Take, for example, what is perhaps almost the oldest—that of glass-making. It is the engineer who has made possible the large-scale manufacture of jars and bottles to an extent that was quite out of the question as long as human beings and hands were required to blow and fashion them.

The importance of the chemical industries in the scheme of national defence and national progress is at last becoming understood, and must be taken into account in the refashioning of our educational system. Another essential change is in our knowledge of the raw material resources of the Empire. Possession of the better maps contributed to the successes of the victors of 1870. And it must be a State matter to map-out all our mineral resources, that they may be placed at the disposal of industry by, and I have come to the conclusion under the control of, the State. I cannot picture a future in which it is possible to work our mines, for instance, with regard only to the present, or in which anything but a surplus output goes abroad before home requirements are satisfied. It should be an offence to supply coking coals for ships' bunkers, even though the price paid is a good one. The State must consider whether it is better to export coal for steel-making by our competitors, or to send them the finished article. If we do send our raw materials abroad, their sale should be made a matter of inter-State exchange and barter. It ought to be possible to make a beginning by exporting coke instead of coal, and so increase our control of bye-products, the need for which is rapidly increasing. We should thus work-up the nitrogen content of our coal, and export this instead of the mineral, which should be recognized as the property, as it is the heritage, of the nation.

It has been a matter of deep regret to me that my recent year's holding of an office which I highly value has been an even more troublous and anxious time than its predecessor. The country will never know, still less repay, its debt to this Society. It has pursued its way for the most part unheeded and unrecognized, save by the few here and beyond the seas who know its worth. To-day its star, as is that of the industries it represents, is in the

ascendant; and with this growth your Council are ever on the watch that its usefulness shall keep pace.

A Vote of Thanks.

Prof. Henry Louis, in proposing a vote of thanks (which was heartily accorded), said that Mr. Carpenter was an example of how thoroughly well a scientific man could be trusted to take charge of the economic and administrative affairs of a big organization. The scientific man had been looked upon as living too much in the abstract, and not being able to descend from this nebulous region into the region of hard solid fact. The Society had been fortunate in having him at the helm during a period of great development in its external and internal policies, and particularly at a time when the whole nation had awakened to the fact that every industry was a chemical industry. It would be the task of the Society to see that the nation did not again sink into a state of apathy with regard to science. Personally, he thoroughly agreed with Mr. Carpenter in his views on education. He had for a long time advised every lad who reached matriculation standard to go into the engineering workshops for six or twelve months, because he was quite convinced that, whatever a lad was going to be in after-life, this was about the best bit of practical education he could have. So far as the working classes were concerned, he was glad to see that employers were realizing that high wages were to the benefit of both employed and employer. The salvation of the country lay in high wages and an honest equivalent in work; and the working classes must be convinced of this. He was also thoroughly in agreement with Mr. Carpenter's desire to see the resources of the country in raw materials properly organized and dealt with; and great satisfaction was to be derived from the fact that a Committee had been sitting to advise on the appointment of an Imperial Bureau of Mineral Resources. This was a very hopeful outlook for the future.

Report of Council.

The report of the Council (which was adopted) stated that Prof. Henry Louis, of Newcastle-on-Tyne, had been nominated as President in succession to Mr. Carpenter. The Council recommended an increase in the annual subscription from 25s. to 30s. Dr. Rudolph Messel, F.R.S., has been re-appointed to serve on the Governing Body of the Imperial College of Science and Technology for a further term of four years. The Council have appointed two representatives to the Refractory Research and Standards Committee recently formed, in order to consider the co-ordination of research work on refractory substances, and to endeavour to secure joint action in carrying further the work of standardization.

A resolution with regard to the increase of the subscription, as set out above, was passed after a short discussion.

The President explained that the object of the proposal is to provide better office accommodation in London for the staff, and also to meet the expenses of the extension of the Society's "Journal." As to the possibility of a building in London which will provide a rendezvous for the chemical industry as a whole, Mr. Carpenter said the Society would be pleased to discuss the matter with the Chemical Society; and he was gratified to hear that the latter would shortly be going into the question.

The reading of papers was then taken in hand. Abstracts of those of more particular interest to readers of the "Journal" follow, with a report of the discussions. It may be mentioned here that opportunity will be taken to reproduce some of these papers in full, as soon as they are released for the purpose by publication in the Society's "Journal."

SOME OBSERVATIONS ON THE TEXTURE OF FIRE-CLAY.

By Walter C. Hancock, B.A. (Cantab), F.I.C., and W. E. King, A.R.C.S.

This was a brief account of some experiments on a typical Stourbridge fire-clay, with a view to making a comparison of the properties of the raw and the fired material; the idea being to afford some link between the two states, or indicate something of the physical changes which occur on firing. The results were given in a number of tables. It is not suggested that from a set of observations upon one single clay general conclusions can be drawn; but the tables showed that the "clay substance" or material approximating to that represented by the "kaolinite formula," as might be expected, composes the bulk of the finest grained fraction, and the quartz tends to accumulate in the coarser fractions.

Discussion.

The President said he had been particularly interested in the question of refractories, having regard to the difference in procedure between manufacturers here and manufacturers abroad in the system they adopted to arrive at the finished article. He would not say that the difference was a present-day one, because scientific methods were now being adopted in this country by all manufacturers of refractories on a large scale. It seemed, however, that the old method adopted was to take a clay, which, after a due amount of weathering, was mixed with a certain amount of grog; and this was the end of it. That was the Englishman's idea of building-up a refractory material for industrial use. The German idea was quite a different one. They arrived at what the ultimate composition of their clay should be; and they fortified their raw material in order to provide the ultimate composition. In this way, they were able to secure fire-clays which competed with ours, although in some cases the Germans did not possess in their own country all the materials necessary to produce them. The final article which they turned out in this scientific way was, for practical work, better than anything which for a long time the British manufacturer was able to produce. However, as a result of the awakening which he had had, in common with others, the British manufacturer was now altering his methods, and was producing something which was better. But, as far as his own experience went in the refractories in which he was specially interested, he had not yet succeeded in making an article as good as the German one. There were a good many little snags to come in yet; but no doubt the British manufacturer would achieve complete success in the future. He had made considerable progress, but had not yet achieved the point which the Germans had reached when war broke out.

INDUSTRIAL FUEL FROM GAS-WORKS.

By E. W. Smith, of Birmingham.

When the author was originally asked to read a paper on this subject he had hoped to be able to put forward results and certain experimental work then in progress, on the heating of retort-settings by means of external producer gas, and also the use of blue water gas put through ordinary retorts during the process of carbonization, and comparing this with the dilution of coal gas by blue water gas not by means of retorts. However, all these plans were upset by the Ministry of Munitions taking over the plant for other experimental purposes. The paper, therefore, consisted of a series of comments and data on a few important facts and points relating to the industrial use of gas.

Notwithstanding the increasing recognition of the value of coal gas as a fuel for all purposes, and the hopes felt by many people that the use of raw coal for certain purposes might be prohibited, there were still many prejudices to be broken-down. As some indication of the progress that is being made nevertheless, it was mentioned that for the year to March 31 last, the Birmingham Gas Department had supplied 11,000 million c.ft. of gas, 10,000 million being from the carbonization of over 800,000 tons of coal, the remainder being water gas, carburetted for the most part, and produced from nearly 5 million gallons of petroleum oil and 37,000 tons of coke. Nearly 80 p.ct. of the total supply was for power purposes, industrial and domestic. Of this, 20 p.ct. was for industrial heating processes, and 14 p.ct. for motive power. The increase this year since March 31, due almost entirely to heating processes, was 11 p.ct. compared with the corresponding period of last year. The 800,000 tons of coal yielded nearly 570,000 tons of coke, of which 16·55 p.ct. was used for fuel on the works, and the remainder—viz., 487,000 tons—was available for sale. The tar produced amounted to 24 million gallons, from which was obtained benzol, and over 8 million gallons of creosote for boiler-firing—such as was used, and would be used more extensively in future, in the Navy.

The national aim should be to use coal, so that the maximum value was obtained. Even if coal distillation were to cost so much that the net value obtained might be slightly less than the net value obtained by the direct burning of coal, the indirect value to the country in the way of residuals would justify the increased cost. In other words, it paid to carbonize coal rather than to burn it.

The gas industry distilled coal for gas; and the value of the bye-products went to reduce the price of gas. There was no reason, however, why the primary object should be to produce gas. For instance, at the Saltley Gas-Works of the Birmingham Corporation there was an installation of sixty-six blast-furnace ovens producing an excellent blast-furnace coke. These ovens were heated by external producers, the fuel for which was the dust on tips for which there was little sale. The fuel as used consisted of 70 p.ct. of slack; and there was recovered 45 lbs. of sulphate of ammonia per ton. There was a considerable demand for special grades of coke; and the department had installed extensive coke-screening plant.

Then there was the question of briquettes, which were very little used in this country—largely because they were too dense to burn without a large amount of induced draught, in consequence of their cost and their friability under heat. Results, however, had now been obtained which seemed to indicate that these troubles had been almost entirely overcome. [Presumably, Mr. Smith is referring to the briquettes made on the process devised by Mr. Lovell, and recently described in the "Journal," as he stated during the discussion that the Birmingham Gas Department are not actually making them.]

Coke contained sulphur, not only fixed but combustible; and coke containing not more than 0·3 p.ct. of combustible sulphur was being used for fires in the trenches in place of charcoal. Attention should also be given to the tar, of which 10 gallons were obtained per ton of coal. The composition varied with the type of distillation plant. Used under a boiler, 1 lb. of creosote would evaporate 11·24 lbs. of water, or nearly twice as much as could be obtained from coal. In using creosote, special burners were used, requiring from ½ lb. to 3 lbs. pressure per sq. in. Used in this way, extremely high temperatures could be obtained.

Gas was, of course, the most important fuel for the gas-works; and the tendency was to standardize the quality in terms of calorific value. Over 90 p.ct. of the gas used for heating purposes—including incandescent mantles—was now supplied on a calorific value basis; the general minimum standard at present being 500 B.Th.U. It was impossible to find from public records, however, what determined this standard, and what were the economic and scientific reasons for it. So far, it had not been possible to produce such a quality of gas from the average coal and using

the usual methods of carbonization, though this quality had been turned out by a number of gas-works.

It was significant that railway companies, as large consumers, were now taking a keen technical interest in gas supply. They had suggested that there should be a limit to the amount of inert gases allowable in town's gas. This might be another means on their part of ensuring a higher quality for the calorific value. There was no doubt the companies would not be satisfied with a good quality blue water gas of 300 B.Th.U., even if in that case the inert gases were less than in a good coal gas. If 500 B.Th.U. were agreed upon as the standard, unless a good quality blue water gas were used for dilution, the inert gases were bound to be high, and the flame temperatures would consequently suffer. Nevertheless he had seen a cupro-nickel furnace, doing 250 lbs. of metal per heat, working with blue water gas of 300 B.Th.U. at a temperature of 1700° C., and the B.Th.U. per pound of metal compared favourably with those when using a good coal gas.

The Heating, Lighting, and Ventilating Committee of the University of Leeds and the Institution of Gas Engineers were now making a study of this question. They were making a practical effort to evaluate gas of varying qualities and composition for different purposes. The range of qualities would be a wide one; and the results should make it very much easier for the gas engineer to decide what gas he should make to give the greatest service to the consumer. Certainly, the best measurement of gas, so far as the consumer was concerned, was on units of power rather than volume. Too high a quality was as bad as too low a quality. Variations, too, were bad; and although it was not possible, in his opinion, to obtain a coal gas or town's gas with a less fluctuation than 10 B.Th.U. either way during a day's run, still that would not affect a heating proposition, because there were many other difficulties that militated against a good service of gas. However, after the war, when it was possible for statutory standards to be again observed, the consumer should have little of which to complain.

Dealing briefly with the question of internal or external producers for retort-settings, Mr. Smith said the former were not usual, but they had certain advantages. The fuel was fed hot direct from the retorts into the producers in the case of horizontal and inclined retorts. With vertical retorts, the coke was fed cold into the producer. Then the producer gas was passed immediately from the producer into the retort-setting, thus conserving the sensible heat of the gas for heating the retorts. The radiation losses from the producer could be largely ignored, as the producer was surrounded by the setting being heated. The capital cost was less than with external producers.

Some of the drawbacks were, the large amount of labour in looking after the fires, and, if poor coal was carbonized, poor coke was produced, heats suffered, and still worse results were obtained due to bad fuel round the retorts, and the life of the setting was likely to be reduced. The quality of the gas produced, however, when working under satisfactory conditions compared with that of the external producer. The calorific value was 112 B.Th.U. net; the make of gas per ton was 10,000 c.ft.; the coke was 10 cwt. per ton of coal; the temperature of the producer gas before combustion was 1000° C.; and the sensible heat in 1 c.ft. of the producer gas was 29 B.Th.U. Therefore the total heat entering the setting per ton of coal carbonized would be $112 + 29 \times 10{,}000$. Although this matter had been given considerable attention to in recent years, very little data had been published; but from experience which he had had during the last few months with very large muffles, in which the producer gas was not preheated, the temperatures obtained in the muffles were such as to make it quite possible to heat-up retort-settings without external producers.

The last point dealt with was low-temperature carbonization. There seemed to be no general agreement as to the object of commercially developing low-temperature carbonization. The experimental work of experienced research chemists indicated the great difference in the results obtainable by high and low temperature carbonization. Those who had attempted to extend low-temperature carbonization from the laboratory stage to practical working had varied in their aims. Some had hoped for high benzol yields, and others had anticipated high tar yields, to justify the process. Others had had as their main object the production of solid fuel that would burn easily in the domestic grate without producing smoke. Those who were in the closest touch with many of the processes that had been, and are being, tried agreed that so far no really reliable results had been obtained. That, however, did not mean there was nothing in low-temperature carbonization. He did not believe there had been sufficient competent research work carried out to enable anyone to pass an opinion either way; but if one judged by the average published results, and particularly recently published results, no more would be heard of the process. The paper by Mr. M'Laurin, of Glasgow, was typical of the kind of thing he meant. It seemed to him a pity that such an important subject should so far have been left in such hands; and the paper he had mentioned might almost be taken as typical. One of the chief claims for low-temperature coal distillation was that power stations could be put up at the pit's mouth, and that domestic fuel could be produced—the gases being used for power generation, which could be distributed over long distances. The chief advantage of this method would be that it centralized carbonization and power production; but it decentralized the domestic fuel that had been produced. It seemed to have been overlooked that the volume of coke produced was very considerably greater than with high-temperature distillation; and as the coke would have to be distributed in small quantities as consumers desired, the question of freightage was important. Again, if a balance-sheet was drawn-up of the actual figures published so far, and the tars that were made were examined, it would appear that the cost of washing for the light spirits for motor and other purposes was such as almost to neutralize the value of the increased volume of tar obtainable by low-temperature distillation.

The chief disadvantage so far as could be seen from the regrettable lack of information on the subject was that power was being thrown away. Low-temperature carbonization gave about 5000 c.ft. of gas per ton of 500 to 600 B.Th.U. gas. Compare this with 12,000 c.ft. per ton of similar gas from high-temperature carbonization, and it would be seen that 30 to 40 p.ct. of actual power was being wasted in the form of gas. The power was left in the form of solid fuel.

There was a strong case for the Government or some competent authority to set up a scientific and practical Committee, versed in the conditions of carbonization, to go into the whole subject (even if at considerable cost) in an independent manner, so as to settle it as far as was practicable at the present time.

Discussion.

The PRESIDENT, referring to the last remark in the paper regarding the appointment of a scientific and practical Committee to go into the whole subject of coal carbonization, said it was a satisfaction to be able to say that one of the activities of the new Government Department of Research would be in the direction of investigations similar to those suggested. The Fuel Board, which was a branch of the Research Department, had decided that the matter was so important, and that the opportunities for arriving at the true conditions so unsatisfactory, that it was a matter of national importance that absolutely unimpeachable experiments should be carried out. In other words, it had in the present state of affairs become a duty of the State to see that the fullest possible information with regard to the utilization of its fuel resources was made available for the nation at large. This was quite a broad-minded view to take, and was one that we should hardly have expected to have happened some years ago. It was nevertheless the fact that negotiations were in a fairly forward state with regard to the preparation of land for the erection of the necessary works.

Professor HENRY LOUIS said he could only speak on generalities, as in the absence of a copy of the paper it was impossible to keep the figures in mind for the purpose of criticism. The point of greatest importance was the need for so dealing with fuel as to get the maximum value out of it. In using such an expression we must be clear as to what we meant by "value." It could be taken from many points of view. Coal could be treated in order to get the maximum pecuniary value out of it, and yet not to secure the maximum benefit for the nation. On the other hand, it was perfectly possible to treat coal so as to get the maximum power value out of it and again not secure the maximum benefit possible. It was a very complex question indeed, and enormously difficult to determine, as there were so many different factors to be taken into account which were not fixed factors. He was pleased to hear that the briquetting of coal slack and coke slack was receiving serious attention. He had for some time been urging it on the authorities that they should pay attention to this form of patent fuel. Patent fuel had never caught on in this country as it had on the Continent, simply because we had had good and cheap coal all through the country. There were, however, a certain number of works making patent fuel; and, speaking from memory, he believed three-quarters of it was exported. At a time like this, however, it seemed to him that coal control should become an actual fact and not a mere phrase, and that we should have coal depôts established at all big centres to deal with the accumulations of dust by setting up patent fuel factories. There was likely to be a pressing demand for coal in the large centres of population in the coming winter. Pitch, to put it in a mild way, was not dear; and the present waste of coal and coke dust which was going on could be prevented if energetic steps were taken in this direction. He was glad to know that the manufacture of briquettes was not being overlooked in Birmingham, and sincerely hoped that other centres of population would follow this lead. This was one of the pressing economic questions of the moment.

Mr. W. J. A. BUTTERFIELD agreed with the author that one of the most important questions to be considered is the quantity of inert gases permissible in a public gas supply. It was one of the signs of the healthy condition of the gas industry that there was now to be an inquiry from within into this very question; and they might anticipate before long that the gas industry would recommend gas undertakings, of their own initiative, to keep the quantity of the inert gases within reasonable bounds. One of the most prominent gas engineers in the country, whose name he would not mention, had for years past made it a practice to keep the inert gases within 10 p.ct. This, perhaps, was a rather lower limit than many gas undertakings, who used water gas, were prepared to accept. There was no question, however, that some such limit—say, 2 or 5 p.ct. higher than that—must shortly be recognized as the maximum permissible. The question of the use of water gas in public supplies was not so much whether it should be allowed, but that it should be used approximately in uniform proportions. It was an intolerable nuisance to a consumer to have 5 or 10 p.ct. water gas one day and 50 p.ct. another. Yet there were some districts in the country where this state of things prevailed. He believed that many consumers would rather pay a considerably increased price provided they had the same uniformity, which could be secured, as in a neat coal gas. He was pleased the author stated that coke briquettes were now a greater success than formerly—the more particularly in connection with low-temperature carbonization, because the coke thus produced was so extremely bulky that the transport costs were very much higher for the same fuel value than with coal. It might be possible to deal with this coke by pulverizing and briquetting it, so as to get a fuel which would have something of the compactness and density of coal. When considering the question of low-temperature carbonization, it must be borne in mind that after all the value of the products

was their fuel value. Their value for any other purpose might not have very much effect on the ultimate results. This being so, it was a question whether raw coal could be turned to the same advantage as the gas coke and tar resulting from carbonization. If coal was pulverized for certain purposes, such as cement burning and boiler firing, it was difficult, in particular cases, to see how carbonization could give any better return. If smokeless and complete combustion could be secured by the use of pulverized coal, he failed to see what justification there was for installing the enormous plant in which to carbonize the coal. Looking at the small units of plant with which many low-temperature carbonization systems were worked, it was a question whether the product obtained represented an ultimate saving of fuel to the nation.

Mr. DRUMMOND PATON protested against the rather disparaging attitude of the author towards those who had experimented with low-temperature carbonization. He himself said all honour to these men. They had worked without return, and their lack of success was not due to themselves, but to gas undertakings and organizations like the Society of Chemical Industry, who should have seen to it that their work was supported more than it had been. One of the difficulties was that all coals had their characteristics, and they could not all be treated on any definite basis. There were many millions of tons of coal in this country which could never be used until low-temperature carbonization came into operation; and this was why the Society should support the men who for ten years had been working at the question. He was one of those who, according to the author, had been getting inaccurate results; but he had spent his life trying to get something done. Take a coke of a pitchy and resinous nature. It was impossible to coke it in the ordinary form of retort; but under low-temperature distillation, in vacuum, a high yield in oil could be obtained. He submitted that the question to be settled was the relative value of the distillates in low-temperature and high-temperature distillation. It was not a question of how many cubic feet of gas per ton was obtained. It was a question of the future of aerial transport, and the supplies of oil which would be required for such purposes; and the highest recovery of oil from coal had been regarded as one of the biggest assets of the country. This oil would be obtained from the coal that was now left in the mines of this country (to the extent of 25 million tons a year) by means of low-temperature distillation. One who had done much valuable, but unrecognized, work on coal characteristics was James Lomax, of Bolton, although he had now in old age been honoured by the Geological Society. It was impossible to tell all that could be obtained from any individual coal in the way of fractions, unless it was studied. In regard to briquettes, these gave 5 p.ct. better thermal efficiency than coal; and as the desire to-day was to save transport, it was surely better to transport briquettes than loose coal. Furthermore, the use of what was at present waste coal was a question of national economy; and briquetting was one way to promote this. If the ash content, however, was too high—say, 20 to 30 p.ct.—it would be impossible to briquette. But such coal could be gasified; and there was no reason why destructive distillation could not be combined with low-temperature carbonization. He had started to work in this direction eight years ago, and had succeeded in carrying the proposition to a practical conclusion in his own county of Lancashire, where they were moving towards a station on a 250,000 c.ft. basis. As regards the appointment of a new Committee or Commission, he suggested that they had on it men who knew something about the subject to be investigated. He had had occasion to discuss the matter with one gentleman on a Committee dealing with coal, and he had confessed that he knew nothing whatever about coal.

Mr. SMITH, replying to the discussion, said that Mr. Drummond Paton would be pleased to hear that the Birmingham Gas Department had taken up the matter of destructive distillation. The briquetting system he had referred to was not one that was being developed in Birmingham. By the request of the inventor, however, the briquettes were being tried in the city; and, when he was ready commercially, he would publish his results. He had no intention whatever of casting any reflection on the *bona fides* of experimenters on low-temperature carbonization. What he deprecated was that theirs was the only work. It was an important subject; and work should have been done by men who had probably less experience in coal but more experience in research. The example of results recently published was galling to him, and he personally regretted that the Society's "Journal" saw fit to print the paper in question. As to the briquetting of domestic fuel and low-temperature carbonization, they had to overcome a cost of 5s. 6d. for briquetting; and it must be at a fairly low price before it would pay to distribute them.

Mr. F. R. O'SHAUGHNESSY mentioned that at the Birmingham sewage-works large quantities of tar were being received because the owners had no means of disposing of it. This was a bad form of waste; and it had increased since the war. He believed there had been a great growth of private producer gas plants during the past three years.

Mr. SMITH said if these works were on a canal they could easily get rid of their bye-products at a price. Finally, he expressed his regret that the paper was not in print. This was due to lack of time to prepare it sufficiently early.

THE CALORIFIC VALUE OF INDUSTRIAL GASEOUS FUEL.

By W. J. PICKERING, of Birmingham.

The author referred, at the outset, to the increasing importance of the test for calorific value of gas during recent years, and more especially since the commencement of the war. He then proceeded to explain the standards of calorific value adopted on the Continent and in this country—stating that, in this country, the standard is the British thermal unit, and that it is usual, in determining the calorific value of a gas, to arrive first at the figure for large calories, and then to express the result in B.Th.U. by multiplying by the factor 3·968. The general acceptance of the Metropolitan Gas Referees' new definition of the "calorie," as "the amount of heat which will raise the temperature of a litre of water 1° C." was remarked upon.

The author then explained the meaning of "gross" and "net" values (A and B), and stated that a growing body of opinion was in favour of the recognition of the "gross" or "total heat value," in speaking of the calorific power of town's gas, for the reason that the "total heat" capable of being developed from the gas, when burned under the best conditions, is the real calorific value. "Gross" value, it was remarked, is usually identical with "observed heating" value; so that it seemed desirable to adopt the term "total heat value," or merely "total heat," in preference to the old "gross value." The "total heat value," it was stated, could be defined with sufficient precision as "the number of British thermal units produced by the combustion, at constant pressure, of the amount of the gas which would occupy a volume of 1 c.ft. at a temperature of 60° Fahr., if saturated with water vapour, and under a pressure equivalent to that of 30 in. of mercury at 32° Fahr., and under standard gravity, with air of the same temperature and pressure as the gas, when the products of combustion are cooled to the initial temperature of gas and air, and when the water that is formed by combustion is condensed to the liquid state." [See Circular No. 48 of the U.S. Bureau of Standards—"Standard Methods of Gas Testing."]

The author then described the two types of calorimeter in general use in this country, and gave a detailed description of the instrument used at Birmingham, as well as the Metropolitan Gas Referees' standard instrument, as designed by Prof. C. V. Boys. He explained that, after the commencement of the war, the supply of calorimeters of the Jünkers type having necessarily ceased, it was decided in Birmingham to make these instruments in the Gas Department meter-shops. Accordingly, a modified and improved design of Jünkers calorimeter was evolved, which has given every satisfaction under actual testing conditions.

The arrangement of apparatus used in testing for calorific value, apart from the calorimeter itself, was discussed; the importance of a proper water supply of uniform temperature, the need for careful governing of the gas under test, and the necessity of using properly checked thermometers, being dealt with. A bench containing two complete sets of apparatus for testing for calorific value, as employed at Birmingham, was shown in illustration, and also the special method adopted for drawing fresh gas on to the apparatus before commencing to test, in which use is made of the vacuum in the inlet exhauster main to "pull over" the gas, through a Rotary meter fitted with outlet regulating cock and gauge.

The method of testing employed at Birmingham was given in outline; the importance of regulating the flow of both water and gas through the calorimeter, so that the number of heat units developed within the latter during each test shall be approximately the same for all gases, whatever the quality, being particularly emphasized. To allow of this, the author stated that the calorimeter burner was fitted with needle-valve injector, allowing a gas rate up to 15 c.ft. per hour at 7-10ths pressure, so that producer gas could easily be tested on the instrument while maintaining the same rise in temperature of the water passing through.

In a section devoted to "errors in testing," the author discussed the utility of the correction formula recommended by the Metropolitan Gas Referees in connection with the influence of variations in humidity of atmosphere and temperature of waste gases upon the results of tests. Data from actual tests, made under both average and low conditions of humidity, were given, showing that the correction advocated was very small (about 1 B.Th.U.), and not worth the extra labour involved, so far as the calorific value of gas for modern industrial purposes was concerned. In this connection, the method for testing at Paris, given in the "JOURNAL" for Jan. 30 last [p. 202], was contrasted with the Gas Referees' method.

The effect on the results of tests due to measurement of volume of water heated, instead of weighing, and the effect due to non-correction of the volume of gas burned in the calorimeter for its pressure at the test meter, were considered; and it was shown that the net result of making all these various corrections was under 5 B.Th.U. The author remarked that their aim at Birmingham had been to reduce both apparatus and method of calculation to the simplest conditions, so that the test could be quickly and accurately made by a junior chemist, with a margin of error of 1 p.ct.

Some brief reference to recording calorimeters was made, and a short description of the Beasley Recorder (made by Messrs. Parkinson and W. & B. Cowan, Ltd.) was given. Mention followed of the fact that this instrument is constructed in two types—one being for use with coal or town gas, while the other is specially intended for low-grade gas, such as blue water gas, producer gas, or Mond gas. Both types indicated "net" heating value. The need of a recorder which would give the "total heat value" of gas was remarked upon; and it was hinted that very probably in the near future an instrument of this type would be placed on the market in this country, so that it would no longer be necessary, after the war, to go to Germany for this purpose, as it had been in the past.

There was no discussion on this paper.

SOME SOURCES OF BENZENE AND TOLUENE FOR HIGH EXPLOSIVES.

By T. F. E. RHEAD, M.Sc., of Birmingham.

The author reviews the present state of our knowledge concerning the methods of production of benzene and toluene, observing,

however, that much valuable work has not yet been published, for national reasons. The value of these hydrocarbons for subsequent nitration depends on their ease of purification. Paraffins in toluene are objectionable, and processes yielding paraffinic toluene cannot compete commercially with those giving the pure product. The various sources are classified under four heads :

(1) Synthetic, catalytic, and electrical.
(2) Certain crude petroleums containing these hydrocarbons in the uncombined state.
(3) The destructive distillation of coal.
(4) The thermal decomposition or "cracking" of petroleum oils.

Four methods of production are mentioned under Group 1 ; but, as far as is known, they are all still in the experimental stage. Under Group 2, the author refers to the fact that it is now well known that considerable quantities of benzene and toluene can be obtained from the crude petroleums of certain districts ; and this source proved of great value when the shortage of these bodies was serious. By far the most important source is that of coal distillation ; and the author gives a *résumé* of our present information—still very incomplete—on the mode of formation of these hydrocarbons during this process. They are secondary products, formed from the primary thermal decomposition products by three main groups of reactions : (1) Condensation of olefines of 700° C. upwards ; (2) the dehydrogenation of certain naphthenes at 500° C. upwards ; and (3) the polymerization of acetylene at 700° C. Olefines, naphthenes, and acetylene occur among the primary products of coal distillation. Benzene is destroyed at the high temperatures 1000° to 1100° C., and owing to the practice of "high heats" in coal carbonization (in order to get the charges through in reasonable time), much of the benzene formed in a cooler zone is destroyed through contact with the hot walls of the retorts.

The author then deals with the factors governing carbonization in so far as they bear on benzene and toluene production. After referring to the washing of coke-oven and town gas for these substances, he mentions many of the various attempts to obtain an increased yield of them during carbonization. Oil-cracking is then treated ; and the close relationship between this process and coal carbonization pointed out. The results of valuable American work are given, and carburetted water gas as a source is touched on, and some Birmingham results quoted.

In an appendix the author describes, with the aid of a diagram, a new washer, designed to wash 100 c.ft. of gas in four to five hours, in order to determine the crude benzol content of the gas. The apparatus is based on the bubbling counter-current principle, and is similar in construction to a fractionating still head. Prepared oil is used as a washing medium, and then steam distilled, and the distillate analyzed by Colman's method for benzene, toluene, &c. The apparatus is extremely convenient, and gives thorough washing of the gas, which requires to have an initial pressure of about 5 in. of water.

Discussion.

Dr. J. C. CAIN said he was not aware, as the author had stated, that the Germans claimed to have discovered benzene before Faraday. Also he disagreed with the author that synthetic phenol is much purer, and therefore more satisfactory, than phenol obtained from coal tar. Such a statement, in fact, was absolutely incorrect. There was no difference between the two phenols. The author suggested that benzene was purified by freezing. Had he used such a process? The work of Rollason, Stevenson, and others upon carbonizing coal with lime or limestone was interesting ; but he did not think it was much value to mention it in this paper, because if the process were tried it would be found most unscientific and useless.

Mr. W. J. A. BUTTERFIELD, speaking with regard to carburetted water gas, said he published figures 20 or 25 years ago showing that it was quite possible to work carburetted water-gas plants so that the vapours in the gas consisted almost entirely of the aromatic hydrocarbons.

Dr. R. LESSING asked what was the percentage extract of oil from the gas after recovery, and what was the percentage recovery during the distillation process? It seemed that the amount of oil mentioned n the paper—viz., 4 litres per 100 c.ft.—was not far above that used n practice where high recovery was attempted. Therefore he was not quite sure whether the whole of the extractable hydrocarbons in the gas would be got out. At the same time, if the concentration of the benzolized oils was a low one, what was the efficiency of the steam distillation and recovery of benzene?

Mr. J. H. ALCOCK said that, as a pupil of the late Theophilus Redwood (father of Sir Boverton Redwood), he had been told that coal gas was originally carted from one house to another very much as cylinders of oxygen and carbon dioxide were to-day. These cylinders, when they were returned, contained a liquid which was sent to the Institution where Faraday was engaged. In a short time several gallons were collected ; and he believed this was the true history of the origin of benzene. Unless the author had a first-class reference to support his statement, it should be cut out.

Prof. W. A. BONE said he was under the impression that the gas which the previous speaker mentioned was oil gas.

Mr. RHEAD, in reply, said he had taken the reference to the origin of benzene from a well-known text-book on coal tar and ammonia, and, similarly, the reference to phenols came from a recent work. Personally, he had no views on the matter. With regard to nitrating toluene, a recent American publication showed that up to 1 p.ct. of paraffin did not make much difference, but a large percentage made a very considerable difference. Paraffins from petroleum distillates were, he believed, being used in America ; and although he was not quite clear, he understood that it made the process longer, and introduced another factor. If they could get pure toluene, however, it simplified the process to this extent. As to water gas being used for aromatics, many people knew this ; but he did not believe the Government knew it when they started up, because they seemed to hesitate whether they could wash water gas when starting washing for toluol contents.

Mr. E. W. SMITH said that one of the first plants put up for extracting toluol was at Manchester, and there water gas was washed from the beginning.

Mr. RHEAD, speaking with regard to the percentage saturation in the washer described in an appendix to the paper, said that, working with ordinary coal gas giving 3 gallons of crude benzol per ton with 3 litres of oil, the saturation was about 3 p.ct. As to steam distillation, he had been using oil which distilled at 250° to 300° C., and by steam distilling to a very high degree, the amount left in was reduced almost to a negligible quantity.

RECENT DEVELOPMENTS IN THE INDUSTRIAL APPLICATION OF TOWN'S GAS.

By C. M. WALTER, of Birmingham.

In this paper, the author sketched recent developments in Birmingham in the application of gas to industrial purposes. While holding the opinion that the heating efficiency of the gas-furnace would undoubtedly be increased, he thought we were appreciably nearer the time when solid fuel for industrial purposes will be a thing of the past. As an instance, he mentioned the case of a gas-furnace installation for annealing glass. This consists of two 74 ft. long by 5 ft. 6 in. high furnaces, with a combustion chamber 20 ft. long. Gas was supplied at ordinary town pressure, and ordinary atmospheric burners were used ; the secondary air being preheated. The result of tests showed that to maintain a temperature of 550° C. a gas consumption of 750 c. ft. per hour was necessary ; and the overall heating efficiency was 30 p.ct. A similar direct-fired furnace gave an efficiency corresponding to about 8·5 p.ct. In the case of gas, the fuel costs amounted to 11·5d. per hour, as against 10·8d. with coal. Thus, although the cost of gas was only slightly in excess of that of coal, the efficiency of the gas-furnace was considerably higher ; and making due allowance for the possibilities of improvement in the solid-fuel furnace, the advantages of gas must weigh greatly in its favour in many manufacturing processes.

The paper then described in general terms some specific applications in the Birmingham area.

METAL MELTING.

Phenomenal developments had taken place in this connection during the past twelve months, and at present many thousands of brass, gun-metal, and aluminium castings were being produced daily in melting furnaces heated by gas. At the same time, for the production of aluminium alloys gas-heated furnaces having a capacity of 600 lbs. were being employed. Not only has the speed of melting been considerably increased, but the fuel costs have been decreased, and the quality of the alloy improved. The relative efficiency of coal or coke-fired and gas-fired furnaces for this purpose had been shown to be approximately 3 to 15 respectively, as the result of experiments with 60/40 brass. A more recent use was for heating cast-iron ; and in many parts of the country 60-lb. and 120-lb. pots were being used. Although fuel costs were higher than with solid fuel, yet the other advantages more than outweighed this one disadvantage. A hundredweight of metal could be melted for an expenditure of 700 c.ft. of 500 B.Th.U. gas, and from seven to nine heats per pot were obtainable.

ANNEALING.

For iron, steel, and brass stampings, turnings, &c., gas was rapidly replacing solid fuel, especially in cases where it was found advisable to split-up the annealing plant into small units. Repetitive work was handled much more easily, and temperature indicating apparatus was being used with great success. The result again was more expeditious work, greater uniformity, lower costs, temperatures more quickly obtained and easily controlled, and the number of units of plant in use could be adjusted in accordance with the amount of work in hand. The extent to which gas was replacing solid fuel in these particular applications could be gathered from the fact that in Birmingham during the last nine months, plant costing more than £12,000 had been installed in factories, consuming 250 million cubic feet of gas per annum.

CARBURIZING, HARDENING, AND TEMPERING, AND GENERAL HEAT TREATMENT OF METALS.

The same remarks applied here. Special furnaces for particular processes were being designed almost daily, with the result that working efficiencies were being continually improved. During the last six months, a considerable amount of investigation work had been carried out in the Industrial Research Laboratory of the Birmingham Gas Department on carburizing mild steel in a coal-gas atmosphere ; and the process was being applied commercially for the casing of small parts of machine tools, gauges, &c. In this way, it had been found possible to reduce the minimum amount of distortion which took place on quenching.

PYROMETRY.

Special importance was attached to pyrometry by the author. This is a subject which was receiving more attention than it had in the past. Nevertheless, still further attention to it was necessary in the heat-treatment operations on repetition work to ensure

a satisfactory form of instrument being evolved. Although there were some excellent types of instrument available, the trouble appeared, in the author's view, to be largely due to the fact that the manufacturer was not always in the position to advise what type of instrument should be used for a particular purpose.

Discussion.

The President said the paper gave an interesting description of what the Birmingham Corporation had done, and in regard to which, in order to achieve success, they had spent a considerable amount of money, and had installed an extremely interesting and important plant. He believed the Birmingham Corporation plant which supplied gas to most of the furnaces referred to in the paper was unique of its kind in the kingdom.

Mr. Drummond Paton asked what was the air pressure used in the furnaces for dealing with the ferrous metals. Was it high pressure?

Mr. E. P. Taudevin said that, although the uses of gas for furnace purposes were without limit, yet the design of gas-furnaces was really in a very crude state. He did not think he had seen a well-designed gas-furnace yet. He had seen two or three annealing furnaces which gave some promise, and remembered seeing one of German origin which was designed to give the maximum efficiency with the least gas consumption in a given cubical space. Unfortunately, if anything heavy was dropped into the furnace, it broke the furnace floor. At the same time, when speaking of the enormous opportunities for using gas-furnaces, they must not lose sight of the fact that a gas-works had other products for use in furnace work. Coke could be gasified, and then there were the heavy tar oils, which would no doubt be produced in increasing quantities. Again, with the new plants for coke-oven gas coming into use, there would be a tremendous amount of coke on the market, and also heavy tar oils. These could be gasified; and they should take a wide and general view of the application of gaseous fuel to industrial purposes. At present, they were only on the fringe of the enormous field which was open to them.

Mr. E. W. Smith said that if Mr. Taudevin wished to see an annealing muffle of first-class scientific design, he could see one erected by Sir Arthur Duckham, of the Woodall-Duckham Company. There were sixteen muffles, working in the South of England, 15 ft. by 5 ft. 6 in., all resting above the ground, heated with producer gas, so arranged that the bottom of the furnace dropped out in the form of a table. The strip for annealing was placed edgeways on the bottom. The furnace was rarely opened for more than forty seconds, while another table was put into position. With these muffles it was possible in two hours to get 3 tons of metal through, corresponding to 30 to 35 tons throughput per day. It was not possible to determine with the pyrometer a difference of more than 5° to 10° in temperature at any part of the muffle, although, of course, the temperature of the bottom was lower after it was put in. He believed that gas undertakings would have to face the competition of producer gas in such muffles. The flame was longer, and the heating effect was better. He had tried the effect of using water gas instead; but it was nothing like so good, either in the combustion space or in the muffles themselves. The free dilution of producer gas gave a longer and more effective flame for moderate temperatures and over big areas.

Mr. A. E. Tucker said that in London 800 tons of brass was melted every week in gas-furnaces. Was the gas or the air compressed in the case of the furnaces mentioned by the author? He suggested that the pressure should be exerted on the gas and not on the air. This was the invariable practice with the furnaces with which he was associated; and it was a detail of great practical importance, because, by doing so, the action on the pots was reduced. These cost £4 to £5 each; and therefore it was important. Moreover, the heat was more easily controlled. This, again, was important, because the Government specification for copper allowed fairly wide limits. Unfortunately, they did not have scientific workmen to deal with—in fact, they were for the most part quite ignorant men, who did not appreciate the significance of the heat exceeding that which was sufficient to melt the metal. With some gas-fired furnaces, he had known something like 10 p.ct. of zinc to be simply distilled away through this cause. The furnaces he was speaking of were of the simplest kind. The jet conveying the compressed air went into the tangent, and there were half-a-dozen outlets all the way up. The whole of it was made of comparatively thin sheet iron, riveted up on a trunnion and worm gear. The whole was comparatively light, and the pots used were between 600 and 700 lbs.

Dr. Feilmann mentioned that one firm in Coventry had a quarterly gas bill of £3000 in connection with gas-furnaces. He was glad the author had emphasized the need for pyrometric control with furnace work, because very often the value of the furnace was determined by the accuracy with which the temperature could be checked.

The President said the mistake made in depending on the average workman to use pyrometers was that the scale was not sufficiently open. Scientific men were used to having pyrometers with which very small differences were detected; but workmen were not used to thinking on these lines. If, however, the workman was given a fairly open scale, where the difference in figures represented something tangible, there was no difficulty. At any rate, this was the experience with his men, whom he had found no difficulty in getting to work within very close limits.

Mr. Walter, in replying, said the air pressure when reducing iron was 2 lbs., the gas being at ordinary temperature. In many instances, however, it was found more satisfactory to use both gas and air under pressure for this purpose. The main advantage of this was that the variations in gas pressure which were bound to take place were to some extent eliminated. As to whether the gas or the air should be compressed, in Birmingham seventeen miles of high-pressure gas-mains were transmitting at a working pressure of 12 lbs. per square inch. Manufacturers on the routes of these mains could use the gas, and take in air by injection in the ordinary way. Quite a considerable number of these furnaces had been in use for five or six years; and where there was a difficulty in obtaining high-pressure gas in a works, compressors were installed for the purpose. There were several large installations of the latter type. One thing to be remembered with high-pressure gas was that the amount of gas which could pass into the furnace was decided by the size of the jet and the working pressure; and this was found to prevent the possibility of overheating the metal through using an excess of gas just prior to firing. With regard to the President's remarks on pyrometry, in connection with heat treatment it was of great value to employ instruments which had a set-up zero, so that a very open scale could be obtained.

PATENTS.

By Dr. A. Ree.

The author, who is an aniline dye manufacturer of Manchester, in a short paper, urged that, rather than continue under present legislation, a return should be made to the patent law of this country before the 1907 Act was passed, for the reason that the compulsory working clauses of the Act were rendered nugatory as a consequence of the judgment of Mr. Justice (now Lord) Parker in the Hatchett case. Compulsory licences did not, in his opinion, meet the case, as the foreign patentee would of necessity hold back from the licensee much essential information which was necessary to work a process efficiently—it being common knowledge in the chemical industry that very few processes were worked merely in accordance with the patent specification. Whatever could be done in the way of compulsory licences, the patentee would always be years ahead of the licensee. The compulsory clauses of the 1907 Act worked thoroughly efficiently until the time of Lord Parker's judgment; but, unfortunately, on account of this they were only effectively in force for about fifteen months. To make them really effective, they must revert to the interpretation before that judgment. The argument in the judgment, that the applicant to the Courts for an order enforcing compulsory working must show proof that the patent was not being worked in this country, was practically an impossibility, as the patentee would naturally give no information; and, as the law stood at present, he could not be compelled to. If the onus of proof of adequate working was not to rest upon the patentee, then the applicant should have the same rights of "discovery" as in a Chancery suit, by means of interrogatories. He would like to see the Statute of Monopolies put into force in order to prevent Germans from taking out patents here and working them abroad, thus creating a protected market for them in this country at our expense—fostering German industries and damaging ours. It should not be that only part of the invention should be worked here. The difficulties of this were apparent at the outbreak of war, when it was found quite impossible to obtain certain intermediate substances which were essential to the manufacture of certain main products required. If the case he had put forward had been insisted upon years ago in regard to chemical patents, they should now have had an organic chemical industry in this country swallowing that of Germany. He disputed that the German position in certain matters was due to education. If the Chambers of Commerce had got what they had asked for years ago, there would have been an abundance of suitably trained English chemists to carry on. German interests in this country had been largely responsible for the present position; there being a threat of retaliation in Germany if we introduced compulsory working.

Discussion.

Mr. A. G. Bloxam said that apparently Mr. Ree not only wanted to reform the Patent Law, but to get away from the prime principles of free trade; so that any discussion of this matter must become far more political than at first sight might appear to be the case. As to the threat of retaliation in Germany mentioned by Dr. Ree, within a year of the passing of the Patent Act of 1907, both Germany and Austria altered their laws as regards compulsory working, and made them precisely the same as those in the 1907 Act. In other words, German patents granted to foreigners were to be revoked if the patentees worked them mainly abroad. Thus there was retaliation, because previously the conditions had been easier for us.

Dr. Ree said the system of compulsory working introduced in Germany after the 1907 Act was not really retaliation, because before that the German system was more severe than ours; so that the change made things, in a sense, more favourable to us.

Mr. J. W. Hinckley suggested that we had reached a stage in the chemical industry in regard to patents in which the whole system of patents had broken down. In chemistry, to patent a process was simply to tell everybody what was being done, and give the business away before it could be established. Therefore, the patentee required more protection from the State without so much expense. At present, the State obtained all the benefit. There were, nevertheless, a very considerable number of inventions which were not patented simply because the inventor realized he would be giving himself away if he did. He knew of recent instances in which inventions had been sold for very large sums, and they had not been patented. The inventors would probably have spent large sums in patenting their processes, and also their brains and energies in looking after their rights, instead of, as they had done, developing their businesses. So far as the chemical industry was concerned, some State action, other than the Patent Act, was essential in the future.

CO-OPERATIVE RESEARCH.

By H. W. Rowell.

In this paper, entitled "Schemes for Co-Operative Research," the author called attention to the fact that, so far as he was aware, co-operative research is unknown in this country, whereas it is practised extensively in America. A large research organization could afford to buy better brains and plant, could risk more on unsuccessful work, and had more success and was less costly in

proportion to its results than a small laboratory. There were comparatively few works in this country, even in the distinct chemical industries, employing separate research staffs; fewer still which thoroughly equipped their staffs; and none which spent sums comparable with German or American firms of similar importance. The war had forced home upon us the fact that we are not so much individuals as a nation in trade and manufacture, and it seemed that the individual firms in many industries would have to formulate working agreements of various kinds if they were to meet American and similar world competition. This suggested the broadest type of scheme on the lines of the technical combination of about twenty firms of incandescent electric lamp manufacturers in the United States, which spent a large sum annually on co-operative research.

A group of manufacturers of (say) sulphuric acid or tar products would pool for their common good investigation into raw material, methods of manufacture, improved products, disposal of bye-products, outside competition, and so forth. A full-sized factory could by run in connection with the laboratory, as in the case of the American lamp manufacturers, to provide exact working data and efficiency methods and help pay the cost of research.

At the other end of the scale, something on the lines of the Mellon Institute in Pittsburg might be adopted. A large institution in charge of an experienced director and a small permanent staff of specialists was erected and endowed by subscription. It was fitted with a number of private chemical and physical laboratories, and was, or might be, fitted with experimental machinery of the type required on a small works scale. The manufacturer placed his problem before the director, who found him a University graduate with suitable qualifications to carry out the work at an agreed salary. It was then arranged to carry on the work for a maximum time; and the chemist had the sole use of one of the laboratories and certain experimental plant, the guidance of experts on the staff, the use of the library, and other general assistance for a definite sum. Or the institute might agree to use the permanent staff only and take part payment by results.

There was no doubt that the first scheme of co-operation throughout a trade was the most profitable to all concerned; but there seemed to be no probability of the British manufacturers combining in this wholesale way for many years to come. Something less ambitious, organized in such a way that it could be developed into the full scheme as progress demonstrated, seemed to meet the present state. The tar trade might be taken as the first example, for it seems to be faced with both a commercial and technical revolution after the war. Coke-ovens and large gas plants were partly refining their own products in competition with the tar distiller. Coke-oven and vertical retort tar was quite different from the old types, and in increasing supply, and crude benzols and ammonia were more fully recovered. Methods of distilling and fractionating were altering, and required alteration, and the products of distillation would have to be marketed in a different state of purity, and the values of tar products—never very stable—were likely to be altered considerably. The analytical tests accepted for sale purposes in the trade were sheer guesswork, and the chemists employed were not allowed to alter them. The manufacturer explained that the custom of the trade—that hoary British institution—could not be altered; yet the Ministry of Munitions recently altered the tests for benzene and toluene, and other good work had been done.

If the tar distillers had commercial agreements as to raw materials, sulphate of ammonia, and creosote, why not in standard tests and products and in research and development of the trade? The tar producers and distillers could subscribe (say, in proportion to their capital or turnover) to institute a central laboratory and experimental works; while control testing and efficiency of existing plant would remain a matter for the attention of the individual works. This laboratory could have two functions—one an analytical department for devising specifications and standard methods of analysis and acting as a referee laboratory for the trade, the other a research department with experimental works and a staff of chemical engineers attached to it.

The central analytical laboratory idea offered no difficulty—the cost would be small, and the results of distinct value; but unless the trade was closely allied by commercial agreements, the question arose as to what work could be undertaken by a central research department. A phase of work of general importance in which business interests could not clash was in raising the demand for, and consequently the price of, tar products, and in meeting competition from other trades and nations. If a research department could make pitch equal to natural bitumen, tar oils into fuel, and lubricant equal to petroleum oils, or discover a use for creosote oil equal to the present demand for timber preservation—and these things are by no means impossible—it would cover its cost many times over. No single firm could provide properly sustained research facilities or be expected to stand the cost of such work, which is for the benefit of the trade as a whole.

The tar-works were the proper place in which to make dye-stuff intermediates, as it economized capital, material, transport, and labour.

Other matters of a non-competitive nature which might be taken up at once were the carriage of dangerous goods, better and cheaper packages, safety measures against fire, explosion, and industrial disease, and fuel economy. If an organization got as far as this, it would certainly develop into a full combination of technical interests. It would follow that the methods of distillation and the value and composition of the tar produced, and the possibilities in blast-furnace, producer-gas, and oil-gas tars were all matters for investigation of profit to producer and distiller.

The quantities and value of the coke, gas, and so-called bye-products could be greatly modified by alteration in the method of working as well as in the design of apparatus; and as coke-ovens, gas plants, and recovery plants are usually in charge of an engineer, the chemical aspect of the problem did not get full consideration. A coke-oven plant would call upon the research organization to inquire into the efficiency of all or part of its plant, or have experiments made on a more suitable type for its particular class of coal. The tar distiller could have his tar supplies tested out on a works' scale, and be advised of a better plan of working them to obtain a more profitable fractionation. There were great possibilities in this which could not be shown on a small-scale laboratory test. The distillers in general could have experiments made in washing and purification of the various products, and the numerous problems of fractionation, distillation, and filtration which trouble the works could be solved on practical lines for the mutual benefit of the subscribers.

It could be agreed that certain details would be private between a subscriber and the research staff, while the majority of the work could be detailed to those in the combination who required it. It would probably result that in time no works would consider a new type of plant offered by manufacturers until the research departments had reported on it.

Discussion.

Mr. E. W. Smith, of the Birmingham Corporation Gas Department, took up the author's point that co-operative research is practically unknown in this country. A considerable amount of co-operative research was going on, of which the author should have been aware, in connection with the Birmingham brass industry. There was a well-equipped research metallurgical laboratory run by the Corporation, to which a very large proportion of the brass casters of the city went with their problems. The work that was being done was entirely co-operative, and fulfilled all the conditions laid down by the author. Surely the author should have known, too, that the gas industry had been carrying out a considerable amount of co-operative research for many years. The Institution of Gas Engineers had its Sub-Committees working in conjunction with University authorities, and chemists had been paid for years for working on technical research the results of which had been available to the whole of the gas industry. Therefore, he did not think the author's statements were justified.

Prof. W. A. Bone criticized in somewhat similar terms certain of the statements made in the paper as to the alleged backwardness of British manufacturers in the iron and steel industries.

Prof. C. A. Keane also thought that the author had gone a little too far in saying so definitely what should and what should not be. There were many ways of arranging research work, and all should be considered and as many as possible tried. At the same time, industrial research fellowships were making great headway in the United States, particularly in Pittsburgh, and every encouragement should be given to them as one contribution towards industrial research. During 1916 no less than 80 men were directly engaged there in industrial research work on behalf of chemical firms by whom they were indirectly engaged *viâ* the University. At the same time, we were not altogether without knowledge of such organizations in this country. Experiments were on trial in more than one institution on lines somewhat similar to the industrial fellowship system of Pittsburgh; and it was encouraging to know that manufacturers in this country were looking to this kind of co-operative research. He had even heard that one firm had written to Pittsburgh for information as to when such research could be carried out in this country! There was too much tendency to lay the blame for our condition of affairs on somebody else; but it was a point of view which must be put entirely on one side. There was no special door at which the blame could be laid. We were all to blame; and let us share the blame as fully as we could, by putting our respective houses in order. One way of improving the position would be to ask manufacturers to submit problems to the educational institutions. The terms would not be difficult to arrange so long as the governing bodies concerned or the local authorities would recognize that the men in charge of their institutions were respectable, honourable men, in whom confidence could be placed, and to whom also authority could be given. This was fundamental. As soon as educational authorities and governing bodies wanted to know everything that was going on, the whole system must fall to the ground. The men must be trusted; and the experience of the war had shown that academic chemists were capable of being trusted and doing work of considerable national value. One of the great difficulties in training chemists for industrial occupations was to keep in touch with the requirements of the industry itself. What he had suggested would be a means leading in this direction. It would also be a means of permitting the most brilliant of our younger chemists to obtain industrial positions, and so save them from the blind alley of University and technical college demonstratorships.

Mr. Rowell, in his reply, said he had put as many points as possible in the paper upon which he could be attacked, as that was a good way of obtaining information; and he certainly had done this. He agreed with Prof. Keane that there were many ways of dealing with the question of research, and that the Universities must have some connection with industry. But Prof. Keane had, so to speak, given all the show away in his instance of a British firm writing to Pittsburgh for information on this matter. The fact was that nobody knew anything about it here; and the chemical trade was not the only "pebble on the beach." The attitude was well exemplified here by that of one of the largest and most successful motor tyre firms, who did not employ a chemist, and who asked why they should. Much the same thing applied in the textile trade, which had been the means of bringing the matter forcibly to his notice. He was glad to hear from Mr. Smith what was being done in Birmingham. He had understood that it had only to do with gas. Nevertheless, he knew that some smelters in Birmingham had not yet come into the organization which Mr. Smith had referred to.

GAS AS A LABOUR-SAVING AGENT.

That the generation of high-pressure steam in quantity for technical purposes is best accomplished by a boiler heated with solid fuel is admitted; but there are hundreds of purposes for which moist or low-pressure steam is required in small quantity. In such cases, the low cost, high efficiency, safety, simplicity, and ease of operation render the use of a gas-fired generator preferable, writes Mr. Gilbert C. Shadwell in the "American Gas Engineering Journal." They can be fitted with safety blow-off and low water alarm; and for continual use an automatic feed is advisable. Consequently, they have found much favour for purposes such as steaming hats, cloth, woollens, velvets, umbrellas, and pleated dress goods, for making feather boas, for curing tobacco, for laundry work, melting honey, steam carving tables, food warmers, &c. The boiler is preferably made of copper with brazed joints, and the outer case of galvanized iron. Burners are fitted capable of raising steam within a few minutes of starting cold. An arrangement for the supply of dry superheated steam can easily be added.

The same periodical contains an interesting description of an "all-gas" factory known as the Errington Mechanical Laboratory. Every article made in the factory must be hardened; and many have acquired a value of £4 or so when they reach the furnace, where a heat up to 2100° Fahr. is required, and a fluctuation of a few degrees either way may spoil the temper. That the proprietor, who has acquired an extensive reputation as a mechanical engineer, should prefer gas to other fuels, is a striking testimonial in its favour. He uses three gas-furnaces, 12 in. diameter, 6 in. by 8 in. opening, and 12 in. square opening respectively, and Bristol pattern pyrometers. During an extended period of service they have never failed; and he states that there can be no question about gas being by far the best fuel for his class of work. Power is supplied by three gas-engines.

Attention is also directed, in a communication from Mr. J. E. Bullard, to the utility of gas in connection with laundry work. He claims that the addition of a complete set of labour appliances to a laundry will enable one woman to do the work of five, which is a great consideration now that so many other outlets for female labour are in evidence. Women find that factory work with machinery is less exhausting, and the hours are shorter than the average day's wash. He urges gas salesmen not to stop at the placing of washing machines, drying closets, ironing or hot mangle arrangements, &c., but to follow up by undertaking the entire lay-out and fit-up of the home or small trade laundry to the best advantage, according to the space available. There should be no waste carrying things from one part of the room to another. Each process should follow in regular sequence. An automatic gas-heater provides an ample supply of hot water at a few minutes' notice. Cold and hot water service should be arranged, also direct connection for running off waste; so that there is no carrying water about. Sometimes the available space is limited, and much care is required to secure a lay-out to the best advantage—another reason why this important consideration should not be left to the consumer.

Industrial Canteens.

It is remarked by "Machinery," while drawing attention to the efficacy of a well-arranged canteen in reducing industrial fatigue to a minimum, that in controlled establishments and national factories alone 810,000 workers are daily provided with complete meals. With the improvements that have now been made in this direction, it is recognized that in the vast majority of cases the industrial canteens installed throughout the country are not intended as war-time measures, but are of a permanent nature. Along with two photographs, our contemporary gives an example of the type of arrangement referred to in a short description of a canteen recently fitted up at the works of Messrs. John Booth & Sons, at Hulton. The building includes a main dining-hall capable of accommodating 300 people to dinner at one sitting. Gas is the fuel used; and the kitchen equipment has all been provided by the Richmond Gas Stove and Meter Company, Ltd. It comprises a large roasting oven, double-oven range, stock-pot and vegetable or pudding steamer, an ample-sized circulator for providing hot-water for washing-up and general cleaning purposes, two small boilers for soups, vegetables, or meat, and a combination carving-table and hot closet, in which meals are placed just prior to the luncheon hour. Convincing proof of the efficiency of the equipment is furnished by the statement that the whole of the 300 workers are served within ten minutes of their first entering the building.

The British Thermal Unit.—Writing to "Engineering" as to the proposed use of the word "therm" [see last week's "Journal," p. 106], "C.R.K." points out that it is nothing new, and "its use seems to have given way to 'B.Th.U.' Therm," he says, "is the term used throughout a treatise on 'Heat and the Steam-Engine,' by I. Warren, M.A., published in Dublin in 1895. On p. 54, it is said: '1 therm = heat required to raise 1 lb. of water through 1° C.—the English thermal unit.' '1 calorie = heat required to raise 1 kg. of water through 1° C.' '1 calorie = 2·2 therms.'"

PRODUCTION OF COKE.

EFFECT OF THE TEMPERATURE OF CARBONIZATION ON PHYSICA PROPERTIES.

A recent paper before the French Academy of Sciences b MM. Georges Charpy and Marcel Godchot describes som results of a laboratory test which has been worked out by th authors for the purpose of providing a means of ascertainin on a small scale the temperature of carbonization which is be suited for improving the quality of coke from coals which do n come in the coking category. The authors' object has been th improvement of coke from such mediocre coals, and the extensio of the series of coals which can be used for coking purposes.

As a criterion of the quality of the coke, the resistance to com pression (expressed in kilos per sq. cm.) is adopted, and measured by a small lever machine. The coal to be tested powdered and carefully sieved (through a 120 sieve) so as obtain all the grains of approximately the same size. It is the kept for several days in an atmosphere saturated with water 18° to 20° C., and in this standard condition of moisture is packe in a small refractory tube and subjected to a pressure of 5 kil per sq. cm. (71 lbs. per sq. in.). The ends of the tube are close by heavy cast-iron discs, and the whole then heated in an electr furnace of such a size that the introduction of the coal does n materially affect its heating power. While this method cann be applied to every coal without some modification, with thos studied by the authors it yields small cylinders of coke of pe fectly regular shape (12 mm. in diameter and 20 mm. in leng (½ in. and $\frac{25}{32}$ in.), to which the compression test is easily applie and which supply practically constant figures throughout a seri of tests.

This method of testing has served to confirm the injurious effe upon coking of the oxidation of the coal (as studied notably b M. Boudouard) and of progressive heating of the coal. In usin it to examine the effect of the temperature of carbonization upo the quality of the coke, the charged tube is introduced into th electric furnace, previously brought to the given temperature, an the heat continued for one hour. The results obtained in this wa are given in the table in the case of three coals carbonized 650°, 800°, and 1000° C. The effects of oxidation on these sam coals has been the subject of previous investigations by th authors. [See "Journal," May 1 last, p. 191.]

Each test was made six times under the same condition the figures show the degree of concordance which the metho permits.

Resistance to Compression, in Kilos per Sq. Cm.

Temp. of Carbonization.	St. Eloy. Single Tests.	Mean.	Ferrières. Single Tests.	Mean.	Noyant. Single Tests.	Mea
650° C. (1200° Fahr.)	20, 22, 19 / 17, 20, 21	19·85	18, 19, 21 / 17, 20, 19	19·0	99, 98, 94 / 100, 104, 105	100·
800° C. (1440° Fahr.)	31, 29, 36 / 35, 34, 32	32·9	27, 30, 31 / 28, 34, 33	30·5	92, 98, 93 / 94, 90, 95	93·
1000° C. (1800° Fahr.)	35, 36, 38 / 41, 40, 42	38·7	49, 44, 48 / 42, 43, 46	45·0	39, 33, 36 / 38, 35, 37	36·

The most remarkable feature of the results is that the effect temperature is different upon the different coals. While those St. Éloy and Ferrières yield at a low temperature a coke whic is practically useless, at 1000° the coke, though still of mediocr quality, is of use for certain purposes. On the other hand, th Noyant coal at 650° yields a good coke, while at 1000° C. i quality is almost below that from the two other coals. The differences are still more marked if, after heating to 650°, th temperature be gradually raised to 1000°. Under these condition the St. Éloy coke is not appreciably improved, while that fro Noyant coal acquires a resistance of 130 kilos. per sq. cm.—i. 1850 lbs. per sq. in.—corresponding with very good metallurgic coke. The authors are pursuing further work, but have publishe the present notes and results in the aim of emphasizing the im portance, in the manufacture of coke, of determining the cond tions of carbonization which are favourable to a given coal.

The Midland Section of the Coke-Oven Managers' Associa tion were this month to have visited the bye-product coking pla of the New Monckton Collieries, Ltd. But owing to extensiv alterations at the place, the fixture has been cancelled. A meetin of the section will be held at Sheffield next Saturday, when Mr. J Kilburn Scott, Assoc.M.Inst.C.E., M.I.E.E., will read a pap entitled: "Manufacture of Ammonium Nitrate by Electric Pow at Coke-Oven Plants."

A recently issued technological paper (No. 70) of the Unite States Bureau of Standards, Washington, is on the subject of th "Durability of Stucco and Plaster Construction." The pap presents a report of progress in an investigation undertaken b the Bureau five years ago in co-operation with manufacturer Though there is in it a good deal of suggestive information, d finite recommendations are deferred until further test results a known. Those interested may obtain a copy by addressing a r quest to the Bureau.

PPARATUS FOR REDUCING VOLUMES OF GASES TO STANDARD TEMPERATURE AND PRESSURE.

By A. V. C. Fenby, of the Whitgift School, Croydon.

[From the "Chemical News," July 6.]

The apparatus to be described has been designed to facilitate ıe reduction of the volumes of gases, measured at known temeratures and pressures, to volumes at 0° C. and a pressure of 60 mm., and to effect a saving in the time usually spent on these alculations. A direct reading instrument for this purpose should e of considerable service in the laboratory.

If the volume of a gas, measured at $t°$ C. and under a pressure f P mm., is pVt, then the volume at 0°C. and under a pressure f 760 mm. is:

$$760V_0 = pVt \times \frac{273}{(273+t)} \times \frac{P.}{760}.$$

he apparatus is designed to measure the factor:

$$\frac{273}{(273+t)} \times \frac{P}{760},$$

which moves along the slotted arm H. The outer portion of the arm, E F, is enlarged, and carries a transparent scale with a centre line, f g, ruled on it. This scale serves as a cursor; and the arm, E F, is called the "cursor-arm."

The arm, C D, is provided with two scales. That, V V, on the left is the "volume-factor" scale; and the scale, T T, on the right is the "temperature" scale. This is graduated in ° C. from 0° to 100°, and from 0° to — 273°, or in absolute temperatures from 0° to 373°. [The figures are not shown in the illustration.] The scale, V V, is marked 1·0 at the point where the line f g cuts it, when the line f g passes through temperature reading 0° C., or 273° absolute; and it is graduated to heat from 0 to 1·7 in hundredths of the unit volume, as shown.

The slide, a b, which moves along the arm, A B, is provided with a pressure scale engraved on it, showing differences of pressure of 10 mm., between 720 mm. and 800 mm. The centre line of the arm, C D, can be moved along this pressure scale by means of the screw, e, which moves the carrier, c d, to which C D is fixed. The arm A B is called the "pressure" arm, and the arm C D the "temperature" arm.

To use the apparatus the temperature arm is set with its centre or zero line over the reading 760 mm. on the pressure scale; and the slide, a b, is moved to the position indicated by the index i, on A B. The cursor is then set to the temperature 0° C., or 273° on the scale T T. The volume factor is 1·0, as shown in fig. 1.

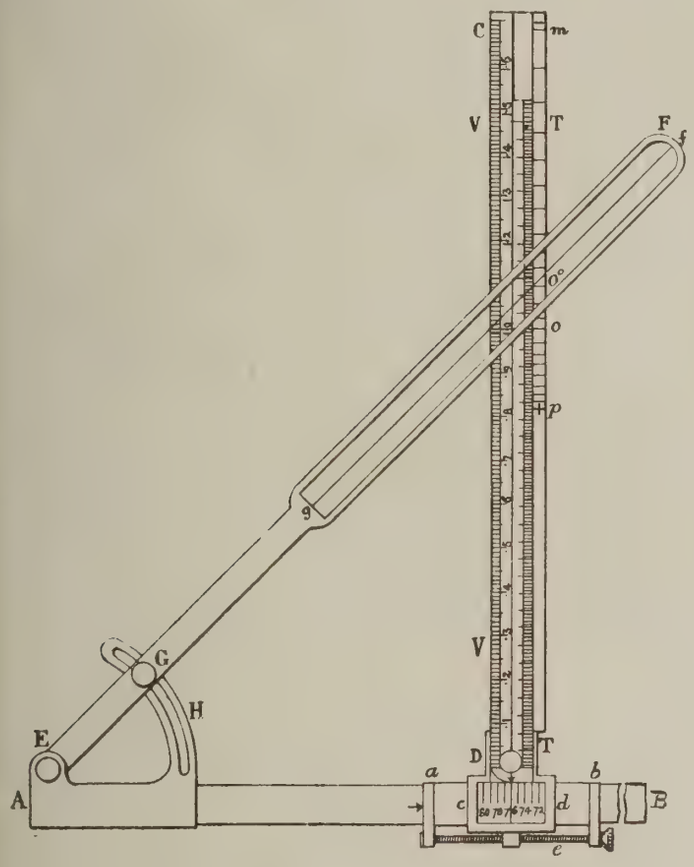


Fig. 1.

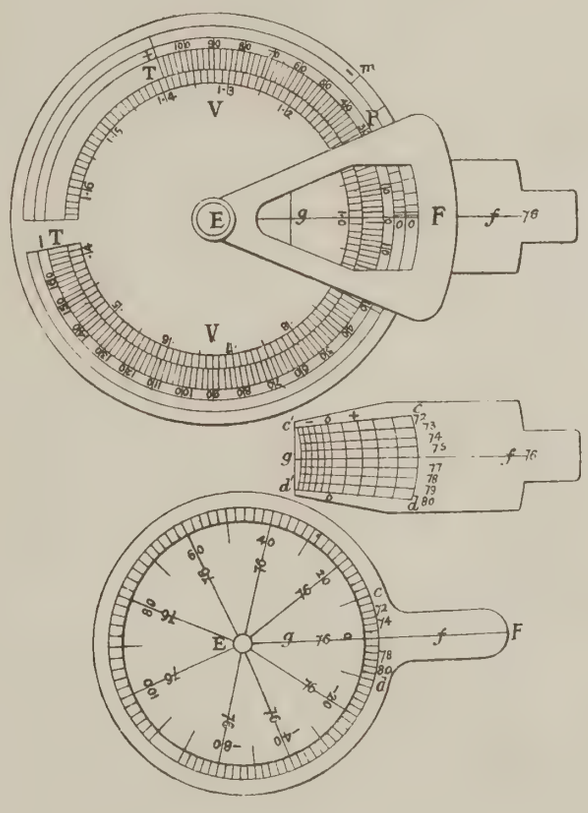


Fig. 3.

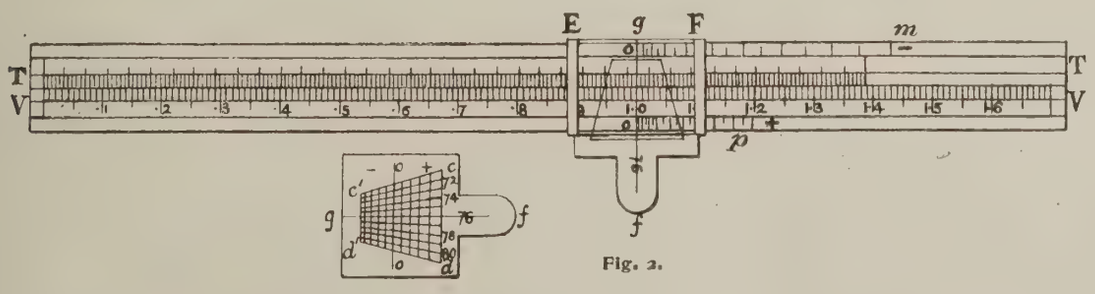


Fig. 2.

by which the volume pVt is to be multiplied to reduce it to volume at 0° C. and 760 mm. pressure; this factor being read off directly from the apparatus.

The apparatus can also be used to calculate the volumes of gases (*a*) when heated $t°$ C. at constant pressure, (*b*) when submitted to a change of pressure at constant temperature, or (*c*) when heated to temperature $t°$ C., and submitted to a pressure P mm. after measurement at 0° C. and 760 mm. pressure.

The apparatus shown in fig. 1 consists of a horizontal arm A B, to which is attached a vertical arm, C D, hinged to the slide, a b which moves along A B, and can be clamped in any position on it. When not in use, C D is shut-down along the upper side of A B. A third arm, E F, is fixed to A B, and turns about the end E. This arm can be clamped in any suitable position by the screw G,

(*a*) If the cursor is moved $t°$ above 0° C. or 273° absolute, the pressure being unchanged, the cursor will give the "volume-factor" for temperature $t°$ C, and pressure 760 mm.

(*b*) If the temperature is kept at 0° C. or 273° absolute, and the arm, C D, is moved by the screw e to a pressure P mm., the cursor reading on the scale V V gives the volume-factor at 0° C. to change to pressure P mm. from 760 mm.

(*c*) If the volume-factor for a change from 0° to $t°$ C., and from pressure 760 mm. to pressure P mm. is required, the cursor is moved $t°$ above 0° C. (or 273°), and the arm C D is then set with its centre line at the new pressure P mm. The cursor reading on the scale, V V, now gives the required volume-factor. Suppose it is required to find the volume-factor for a change from 0° to 15° C., and from pressure 760 mm. to 750 mm. The cursor is set to the

reading 15° C. (or 288°), and the volume-factor reading is 1·056 (factor for temperature change only at pressure 760 mm.). The arm, C D, is now set to the new pressure 750 mm.; and the volume-factor becomes 1·070.

(*d*) The reduction of the volume of a gas measured at temperature *t*° C., and under a pressure of P mm. to its volume at 0° C., and pressure of 760 mm., is effected as follows: The scales are first set as shown in fig. 1 and explained above. The cursor is moved to the temperature (273° + *t*°), and the arm, E F, clamped in position. The arm C D is now moved along A B until the volume-factor 1·0 is under the cursor, and the slide *a b* is clamped. The cursor is moved to the reading + *t*°, on the scale *o p*, shown to the right of T T. This scale, *o p*, is called the "reduction temperature" scale, and it is necessary because the changes of volume are being made on the volume at *t*° and not on the volume at 0° C. A similar scale, *o m*, is shown on the left for changes made at temperatures below 0° C. These "reduction temperature" scales are marked respectively + and −. In the illustration the graduations are only shown for every 10° and are not numbered. When the cursor has been set to *t*° on the "reduction temperature" scale, the reading on V V is the volume-factor to reduce the volume to 0° C. at pressure P mm. The pressure is now changed to 760 mm. by moving C D along the pressure scale; and the volume factor required is read off.

An example will make this clear. A volume of Vcc. of gas, measured at 30° C. and under a pressure of 720 mm., is to be reduced to volume at 0° C. and 760 mm. The apparatus being set as shown in fig. 1, the cursor is set to the temperature reading 273° + 30° = 303°; and the arm C D is moved inwards until the volume factor is 1·0. Then this arm E F is moved down to 30° on the + "reduction temperature" scale, *o p*. The volume-factor is now 0·900 (for volume at 0° C. and pressure of 720 mm.). The arm C D is next set at pressure 760 mm., and the volume-factor is now 0·853. Therefore V cc. × 0·853 gives the volume at 0° C. and 760 mm.

By means of an additional arm between C D and E, and parallel to C D, graduated from 0 to 100, the apparatus can be used when calculating percentage compositions and results of combustion experiments. This arm is not shown in fig. 1. The extra arm, in conjunction with an additional scale along the arm A B, can be used to find "weight-factors," by which the weights of volumes of gases, measured at *t*° C. and pressure of P mm., can be found by multiplying the measured volumes by the "weight-factors."

In figs. 2 and 3 modified forms of the apparatus are given. In fig. 2, the apparatus is shown arranged on the slide-rule pattern. The temperature scale, T T, and the factor scale, V V, are arranged side by side, but one of them is movable parallel to the other, preferably the scale V V. The cursor carrier, E F, moves along the scales, as in a slide rule. The cursor, *c d*, *c′ d′*, is shown separately for clearness. Here *f g* is the 760 m.m. pressure line, and the other pressure lines are slightly divergent, and are crossed by the zero temperature line, O O. Other temperature lines are drawn parallel to the line O O, and correspond to temperature intervals of 20° between + 100° C. and − 100° C. The scale *cd*, *c′ d′* moves horizontally in the carrier E F; and thus any required temperature line can be set over the factor scale, V V. The "reduction temperature" scales, marked + and −, are placed on opposite sides of the apparatus.

Fig. 3 shows a circular form of the apparatus. The factor scale, V V, is inside the temperature scale, T T; but the reverse arrangement may be adopted here. One of the scales is movable (preferably the outer one), which is usually T T. The "temperature reduction" scales are marked on the same scale as that on which the temperatures are marked, and move with the scale T T if this is movable. The cursor-carrier, E F, revolves round the centre E, and the cursor scale, which is similar to that of fig. 2, moves horizontally in a slide in the carrier, E F, which can be clamped in position by the screw E. The circular cursor, shown below fig. 3, may replace the sliding cursor described above. The pressure scale, *c d*, from 720 to 800 mm. is marked in separate segments for intervals of temperature of 20° C. between 0° C. and +100° C., and 0° C. and −60° C.

The method of using these forms is similar to that described above for the original form. When a change of pressure is to be made at a temperature *t*°, the cursor is set with the temperature line *t*° along the edge of the scale, V V, before the pressure change is made.

In the apparatus as described the temperature range extends from 0° absolute temperature to 373° absolute; but for most purposes a more limited range would be sufficient. The range of the apparatus, both as regards temperature and pressure, may be easily extended much beyond the above limits without enlarging the apparatus.

SHUT-OFF VALVES ON GAS SERVICES.

Along with the announcement of the appointment of a Committee on Automatic Gas Shut-Offs, there appears in the American "Gas Institute News" some discussion of the matter which contains points that may be usefully noted. The question first arose out of an inquiry as to the attitude of the gas industry in regard to the installation of gas shut-offs for services, put forward by Mr. W. H. Merrill, the President of the Underwriters' Laboratories at Chicago.

In response to his inquiry, Mr. Merrill was informed that gas companies are now, as they have always been, opposed to the us of any automatic shut-off for gas services, or of any kind of han shut-off set in the wall of a building—it being thought that th ordinary service cock by the curb, and the cock located at th inlet of the meter, constitute the safest and most practicable for of shut-off that can be devised. The curb cock is not even r garded as a necessity for ordinary dwellings; the statement ju made having reference to business and other buildings havi gas-services of (say) 2 in. and over in size. When, it was adde it is borne in mind that only a very small percentage of all fir start in the immediate proximity of gas-meters, and that unle they do so the presence of the gas supply is not a menace, it evident that the gas supply is not a risk. Moreover, even if fire does start in the proximity of a meter, it must be assume that there is a combination of a combustible floor overhead, of fire so small that it would not independently set fire to the floo and of the combustible overhead floor set so low as to be reache by the gas-flame, in order to admit a risk resulting from t presence of the gas supply. If the extremely improbable co tingency is assumed, that a fire should start by the lighting of t gas through a leak in the meter or piping, even then the risk slight. In Philadelphia, during the last twenty years, the numb of gas-meters has increased from 150,000 to over 350,000; a the records show that there has never been a case in which t gas burning from the pipe which supplied the meter was a fact in the extent of a fire. There has also in this period been no fi in which the curb-cock, or a dig-up to cut off the pipe, was slow as to add anything to the loss. The statement is a safe o that very few fires are caused by gas; and none of these wou have been prevented or extinguished by an automatic cut-off, by a hand shut-off at any point. The legal enforcement of t installation of more or less expensive automatic shut-offs on t gas-pipes would be an unwarrantable tax on the gas consum and a handicap to the gas industry. After investigating the que tion in 1915, the Massachusetts Gas and Electric Light Commi sioners reported that no legislation was necessary.

These arguments led to a still further communication from M Merrill, in which he referred to a fire at which several firem were alleged to have been injured in attempting to shut off t gas in a burning building. The answer to this was that t facts of the case showed that, if the firemen had let the ga flames alone, and had devoted their energies to extinguishi the other part of the fire, in the meantime protecting the ceili above the gas-flames by keeping it wet, they would have had lit difficulty in turning off the gas without any risk of injury. "Do smother-out the gas by a stream of water," is sound advic Frequently during, or immediately after, a fire there is need dependable lights, by means of which firemen or others m see their way about; and various forms of shut-offs projecti through the walls of buildings are only a menace, since th operation by irresponsible or excited persons might extinguish t lights when most they were needed.

Specification for Portland Cement.

A United States Government specification for portland ceme is contained in a circular of the Department of Commerce of t Bureau of Standards at Washington, a copy of which is just hand. This specification is the result of several years' work o joint conference representing the United States Government, t American Society of Civil Engineers, and the American Soci for Testing Materials; and it was to become effective on Jan last. It replaces a specification which was adopted early in 19 and is itself recognized as not a final one, but subject to revisi from time to time as occasion requires and as improvement made in the product, in the methods of testing, and in techni knowledge of the material. With regard to the chemical prop ties, the following limits are not to be exceeded: Loss on ignitio 4 p.ct.; insoluble residue, 0·85 p.ct.; sulphuric anhydride, 2 p.c and magnesia, 5 p.ct. Among the rules regulating the physi properties, it is set forth that the specific gravity of cement sh be not less than 3·10 (3·07 for white portland cement). Vario tests are fully described and illustrated. Comparing the n specification with the one which it supersedes, certain essent requirements—such as strength, fineness, and setting properties have been increased; while some unessential matters have be omitted. The Committee point out that the specification can be considered entirely satisfactory, as there is no test which f nishes specific information as to the relative value in concrete the products of different mills. Another thing is that the meth of testing that have so far been devised are not as accurate they should be.

Beehive coke production last year in the United States w according to "Iron Age" [New York], the largest ever record Official figures of the U.S. Geological Survey place the out at 35,464,224 tons, valued at $95,468,127. This is an incre of 7,955,969 tons, or 29 p.ct., over that of 1915, and larger $38,522,584, or nearly 68 p.ct., in value. The average value of coal used in 1916 was $1·26 per ton—an increase of 21 c. o 1915; and the average value of the coke last year was $2·69— increase of 62 c. There were 65,605 active beehive ovens in 19 as against 48,985 in 1915—an increase of 16,620. No new ov were built.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Sliding-Scale Question.

Sir,—It is to be hoped that this important subject will not become tangled with extraneous points.

Under public ownership, gas profit is distributed by the local authority crediting its ratepayers in proportion to rateable value; but the measure of such profit is in no way contingent upon a sliding measure price charged. On the other hand, private ownership distributes divisible profit in proportion to nominal share capital, but always with reservation as to price charged.

Thus of the two categories mentioned, the divisible profit in the second either:

(*a*) Terminates abruptly on the price reaching a given point; or
(*b*) Tails-off earlier.

Consequently, under private ownership we have two distinct classes of capital, which for convenience we will call "A" and "B."

Apart from the general merits of the whole question as affecting "A" and "B" respectively, another class of investor, which we will call "C," is involved. "C" deliberately placed his money under (*a*) conditions, knowing that, if the worst happened, the whole income from the investment would be temporarily arrested. He was under no illusion at all about it; but he now finds that, by a subsequent Act of Parliament, his investment is governed, not by (*a*) conditions, but by (*b*) conditions, and upon the change his wishes were not consulted. His money was and is employed for public advantage, and may be the means of producing gas at something like only half the selling cost of what he believed to be the penal limit under (*a*). It is more than probable that the penal limit in his case was the factor deciding the investment.

In "C's" case, the change from (*a*) to (*b*) was arbitrary, and particular hardship exists. He may be a professional man already suffering war's injustice, and therefore doubly hit; or it may be the case of a lady incapable of earning, and unable to realize the little capital which kept body and soul together in pre-war days. Whatever, however, may be the actual circumstances, the investment, as you aptly observe, was looked upon as secure.

The eyes of the world are directed towards an international struggle for the assertion of right over injustice, for ideals which affect good faith. The same principle lies right here if the Board of Trade can be induced not to overlook it. Lord Moulton's opinion is that

> Without the direct aid of the gas industry . . . it would have been perfectly impossible for this country to have waged the campaign of the last three years, or even for any but a trifling time resist the overwhelming floods of enemies that were poured upon it.

Is this the opinion of the Government? "C's" capital has been used in pursuit of high national ideals, and "C" in asking for bread does not expect a stone.

For ourselves, we are custodians of capital and revenue in a particular industry where profit is regulated by Statute; and we must see that hardship is not inflicted upon those whose confidence we hold. Whatever may now be said indiscriminately of the sliding-scale, it is after all proper in principle, and in the future we may see co-ordination of this principle in all gas undertakings whether under public or private ownership.

July 19, 1917. Oikonomia.

REGISTER OF PATENTS.

Gas-Turbines.—No. 106,931.

Kuhl, P. C., of Landusky, Montana, U.S.A.

No. 14,512; Oct. 12, 1916.

The object of this invention is to provide a turbine wherein the rotating element is actuated by the reaction of water and gas when leaving the turbine wheel. A further object is to provide a turbine "which will be simple in construction, efficient in use, and which can be manufactured at a comparatively small cost."

With these and other objects in view, the turbine consists of a combination of a frame with a shaft fixedly mounted on it; while a bell-shaped member encircles the shaft and has its minor end supported thereon. A plurality of blades is carried by the member and spaced from the shaft, which is provided with a passage communicating at one end with, and adapted to convey water into, the interior of the member. Means are provided for supplying an explosive mixture into the interior and for intermittently exploding the mixture so as to force the water and the resulting gases through the blades and out of them, whereby the water and gases will react upon the blades and so rotate the bell-shaped member.

Charging Apparatus for Gas-Producers. No. 106,977.

Sahlin, A., of Kingsway, W.C.

No. 3988; March 19, 1917.

This invention relates to gas-producers charging apparatus of the type in which a rotating coal distributor nozzle or spout shape is adapted to feed and scatter the coal uniformly over the entire surface of the fuel bed in a producer like that described in patent No. 16,263 of 1903. The distributor is preferably equipped with the adjustable extension referred to in patent No. 16,125 of 1916, and is combined with a rotating feed drum or equivalent mechanism—the two co-acting in such a manner that each intermittent charge dropped from the drum through the nozzle will be deposited by and from the nozzle of the distributor around the bed of fuel at regular intervals, and at a certain constant radial angle from the previous charge, no matter how fast or how slowly the feed drum is made to revolve. The constant angle is so chosen that no multiple of this angle will be divisible by 360°. By so doing no two charges can be deposited on the same radial line on the bed of fuel, except at very long intervals.

Gas Lighting Torch.—No. 107,084.

Keith, J. & G., of Farringdon Avenue, E.C.

No. 9221; June 30, 1916. No. 18,659, Dec. 30, 1916.

This combined invention may be regarded as an improvement on that described in patent No. 24,394 of 1912.

The improved construction comprises (in combination) a torch tube provided with a burner, a collapsible gas-container connectable to the torch tube, a diaphragm governor device serving to compensate for the fall of pressure during the discharge of the container (thus permitting a flow of gas from the container to the burner to feed a pilot flame), and a valve operable manually, directly or indirectly, to permit the passage of an augmented or supplemental gas supply for producing a flash at the burner.

Gas Ovens and Cookers.—No. 107,135.

Thompson, H., of Gainsborough.

No. 13,845; Sept. 29, 1916.

In order to reduce the cost of manufacture, and also to secure "greater economy of gas" and give "better and quicker results," the patentee suggests that the framework or shell of his stove should be constructed of wood, lined with asbestos or other non-combustible material, with an inner lining of sheet metal, so as to exclude all cold air from entering the oven or cooker during cooking operations. For heating he employs, for preference, a bunsen burner, the only opening for air being outside the oven. In the top of the oven a hole is made, over which a pan or other utensil for boiling purposes may be placed during cooking operations. The oven may contain one or more grids or shelves. If the latter are used, double sheets of metal are provided, with the edges turned over so as to connect the sheets and yet allow a space for air between.

Continuous Distillation of Tar.—No. 107,168.

Kilburn, B. E. D.; a communication from Sulzer Frères, Société Anonyme, of Winterthur, Switzerland.

No. 77; Jan. 2, 1917.

This invention relates to the continuous distillation of tar in two or more drums heated from the outside—the tar to be distilled passing through the drums in succession, while the heating gases are guided in the opposite direction along the drums. The arrangement is such that the heating gases are deflected to an extent capable of regulation, from the hottest drum in which distillation is completed to a colder drum. It has been proposed in similar apparatus to employ two stills, each with its own furnace, and to connect the furnace flues by a passage controlled by dampers; so that the gases from either furnace, after passing round the still belonging to that furnace, can be directed to, and flow round, the other still before passing out to the air. In the construction according to this invention, however, the two distilling drums are set in the same block of masonry. The tar is admitted continuously through the coils of a preliminary heater into a drum, where the light oil and the ammonia water are evaporated and conveyed to condensing apparatus. The tar, deprived of its light oil and ammonia water, then flows into the second drum, in which the distillation is completed. This is more strongly heated, and situated at a lower level than the other drum. The pipe conveying the vapours from the second drum leads to another condensing apparatus; while the remaining pitch escapes continuously through a pipe close to the part of the drum which is most strongly heated.

Gas-Fired Furnaces.—No. 107,263.

Davis, H. N., and Twigg, W. R., of Luton.

No. 9543; July 6, 1916.

This invention relates to gas-fired furnaces for heating steel billets or ingots, crucibles, or the like.

The furnace comprises a reinforced fire-brick structure with a curved roof in the form of a half arch, so that one of the longitudinal side walls is higher than the other. The ends are closed by sliding counter-weighted doors. An inner floor (if desired, raised appreciably above the ground level) is built into the furnace independently of the main arch, so as to enable it to be readily renewed when necessary without interfering with any of the other parts. The floor is distanced from the main side walls of the furnace on the burner side by a plurality of vertical brick division-pieces spaced apart to provide a plurality of vertical flues leading into a main outlet flue or tunnel arch formed longitudinally under the floor. Above the flue the floor structure is tunnelled transversely, so as to form an upper supporting floor proper, which is raised from the body portion of the floor structure so as to allow the heated products of combustion to pass both over and under the floor proper before passing down the vertical flues to the outlet tunnel.

The gaseous mixture is sprayed into the furnace through openings near the top of the higher side, so that the products of combustion pass along under the half-arch of the furnace over the articles standing on the inner raised floor, and back between them above the floor and underneath the floor to the main outlet flue underneath. The half arch thus not only serves to deflect the flames down towards the articles to be heated, but also acts in a similar manner to the arch in a reverberatory furnace.

To heat the air to feed the burners an air intake pipe is arranged

with the main outlet flue, and branches lead out from it at suitable points in its length to the separate burners arranged along the side of the furnace—"thus ensuring an ample supply of heated air and making use of the heat of the escaping waste gases."

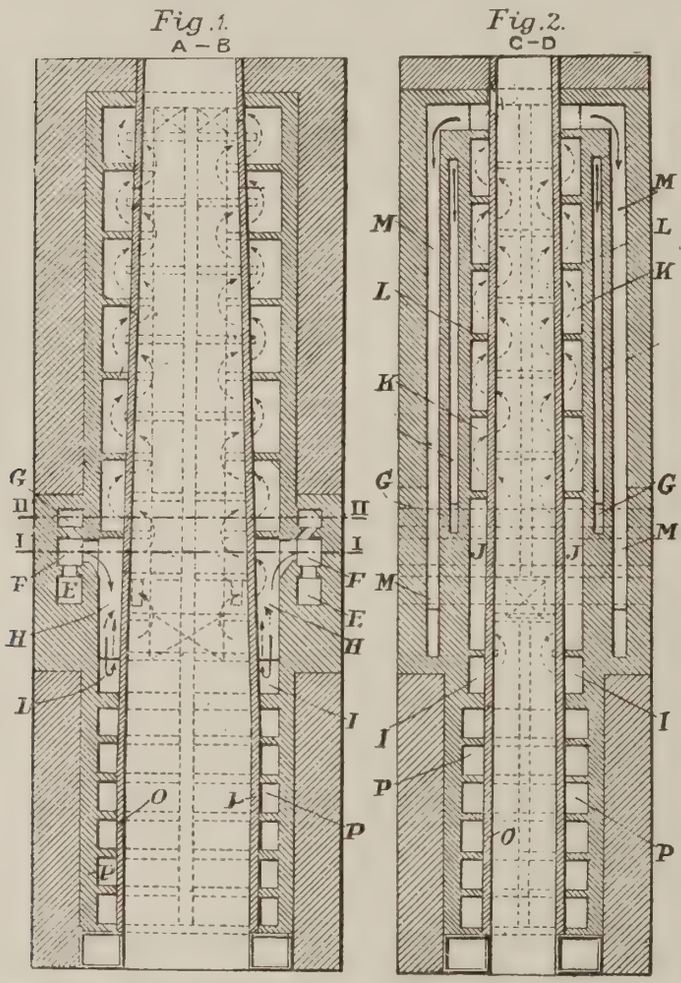
Heating Vertical Retorts.—No. 107,308.

STRASSMANN, P. G., of Crefeld-Linn a/Rhein, Germany.

No. 13,096; Sept. 15, 1916.

This invention relates to the production of illuminating gas in a vertical continuous working retort.

The distilling chamber is gradually heated parallel to the travelling fuel; so that after-distillation (after the passage of the hottest zone) is avoided, and the decomposition cannot occur. To this end the retort is divided up into three parts: (1) The fore-distilling chamber, which is only slightly heated; (2) the distilling chamber proper; and (3) the coke-cooling chamber next to it. Thus the hottest zone of the retort is at or near the middle of the retort chamber, in order to heat especially the part lying below. The gases pass, at first, vertically downwardly through channels arranged along the narrow sides of the retorts, and then through a series of passages into the channels arranged at the broadsides of the retorts passing through them from the bottom upwardly.



Strassmann's Vertical-Retort Heating Arrangement.

This part of the retort is exposed to the highest temperature, and forms the distilling chamber proper. Having passed the channels at the broad sides the heating gases enter the "fore-distilling chamber," through which they pass from the bottom upwardly along all sides of the retort. As the temperatures of the gases decrease with the distance they travel, a decrease will also consequently occur as they pass towards the feed-opening; so that the gas produced in the distilling chamber must come in contact with ever-cooler zones, thereby avoiding decomposition. On the other hand, the fuel passing through the retort meets with ever-hotter zones, thus causing progressive distillation until the gas has been completely expelled.

The part of the retort not exposed to the heat has a prolongation cooled by air or water; and the fuel issuing from the distilling chamber is cooled during its passage through (say) the water-cooled portion the retort, and reaches the emptying device in a lukewarm state.

Finally, the patentee claims that the method and the retort have th advantage that the channels for supplying fresh air for combusti purposes are placed between the main fire gas channel and the ma outlet channel in such a way that the air is preheated by means of bo the heating gases sweeping the retort and the products of combusti leaving the furnace chamber, "whereby the recuperator required other constructions, in this invention becomes superfluous."

Figs. 1 and 2 are longitudinal sections on the lines A—B (fig. 3) a C—D (fig. 4) respectively; figs. 3 and 4 are horizontal sections on t lines marked I.—I. II.—II. (fig. 1).

The channel E receives the carbonic oxide employed for heati purposes from a generator (not shown), and delivers it through intermediate channel, from which it enters the channel F, which al receives the preheated combustion air from the channel G. T burner nozzles extend from the channel F so as to enable them discharge the gases into channels H which descend along the narro sides of the retort and through a series of horizontal passages I co nected with vertical channels J on the broad sides of the retort. T channels are connected with the furnace chamber K, placed above th nozzles and divided-up into four segments surrounding the retort The chamber is provided with displaced walls L for compelling th gases to pass the chamber in a zig-zag direction. The products combustion leave the furnace chamber through a horizontal chann below the furnace cover, whence they pass to the main outlet channe M, arranged vertically in the furnace wall, and are carried off belo the burner nozzles.

The combustion air travels through vertically rising channels (near the furnace chamber and the main outlet channel) and throug vertical channels arranged between. Thence it enters the carbon oxide channel F. Thus "a good preheating of the combustion air obtained, so that special recuperators can be dispensed with."

The heated part of the retort is provided with an unheated pr longation O and with an air or water cooler P. The fuel here cooled to the required temperature.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 18.]

Nos. 9858—10,239.

BEST, C. E.—"Apparatus for distillation of carbonaceous materials No. 9904.

GIBBONS BROS.—"Feeding goods into, and removing goods fron annealing, &c., furnaces." No. 9924,

HARGER, J.—"Utilization and combustion of fuel." No. 9942.

HELPS, G.—See Harger. No. 9942.

HELPS, G.—"Manufacture and treatment of coal gas." No. 10,22

HORSTMANN, S. A.—"Globe or shade for lighting purposes." N 9862.

INMAN, C. R.—"Gas-heated furnaces for metals, &c." No. 10,064

IONIDES, A. C.—"Furnaces." No. 9893.

MARLE, M. VAN.—See Gibbons. No. 9924.

MOHN, T.—"Gas-engine-driven air-compressors." No. 9957.

MURRAY, T. E.—"Manufacture of flanged tubes." No. 10,159.

NATIONAL GAS-ENGINE COMPANY.—See Mohn. No. 9957.

PERRY & CO.—"Adaptation of twin-generator gas plants for manu facture of water gas containing varying proportions of the componer gases." No. 10,059.

SMITH, H. E.—See Perry. No. 10,059.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

"Jena" Glass.

General CROFT asked the First Commissioner of Works whether, a a result of research and experimental work which had been carried o by glass manufacturers, a glass had now been produced of as goo quality as Jena glass; and, if so, whether he would give an unde taking that no more orders would be given by the Government t Messrs. Falk, Stadelmann, and Co.—a firm of German origin.

Colonel GIBBS, in reply, said special fire-resisting glass could no be made in this country; but as the firms who had facilities for it manufacture were engaged on more important work for War Depar ments, it was not practicable to place orders with them for this glas in chimney form. In the circumstances, effect could not be given t the suggestion in the last part of the question without harm to th public service.

General CROFT asked if the Department had given any intimatio that it would do its best to avoid these contracts in future.

Colonel GIBBS said he would inform the Department of what Genera Croft had said.

Montrose Gaslight Company.—The annual meeting was held las Wednesday, with Mr. Muirden, the Chairman of the Directors, pre siding. It was recommended that income-tax be deducted this yea before the payment of a dividend, which was agreed to. Thereafter dividend of £2 10s. per share, less income-tax, was declared, a against £2 12s. 6d., free of tax, last year. The gas manufactured wa 47,995,000 c.ft., which, as against the previous year, showed a decreas of 1,061,000 c.ft. The relative decrease in the gas sold was onl 306,000 c.ft., which meant a reduction of 2 p.ct. on the gas unaccounte for. The retiring Directors were unanimously re-appointed, as als were the officials—Mr. James Mitchell, the Engineer and Manager, an Mr. J. S. Officer, the Secretary.

LEGAL INTELLIGENCE.

PREFERENTIAL CHARGES FOR ELECTRICITY.

A COMPLAINT BY THE GAS LIGHT AND COKE COMPANY.

Attorney-General v. Mayor and Corporation of Hackney.

(*Before Mr. Justice* ASTBURY, *in the Chancery Division.*)

In this case the plaintiff, suing at the instance of the Gas Light and Coke Company, complained that certain differentiation charges made by the defendants in the supply of electric energy were in breach of the Electric Lighting Act of 1882, and consequential relief and an injunction were sought.

Mr. FRANK RUSSELL, K.C., Mr. COLEFAX, K.C., and Mr. PERCY WHEELER (instructed by Messrs. Monier-Williams, Robinson, and Milroy) appeared for the plaintiffs. Mr. A. J. WALTER, K.C., and Mr. G. F. SPENCE (instructed by Mr. Harold George Downer) represented the defendants.

TUESDAY, JULY 17.

Mr. RUSSELL, in opening, said the relators were a Company who supplied gas for lighting and power within a certain district, and the defendants were the Borough Council of Hackney, who supplied electrical energy for lighting and power within an area which was within the relators' district; and they did so under the provisions of the Hackney Electric Lighting Order, 1893. Sections 27, 28, and 29 related to the maximum price to be charged. Subject to the provisions of the Order and the principal Act, and to the right of the consumers to be charged according to the above method, the undertakers might make arrangements as to charge. By the Act of 1882, authorities were authorized to supply electricity; and "public" purposes and "private" purposes were described. It was in respect of sections 19 and 20 that plaintiffs complained of a breach. Section 19 provided that "where a supply of electricity is provided in any part of an area for private purposes, then, except in so far as is otherwise provided by the terms of the Licence, Order, or Special Act authorizing such supply, every company or person within that part of the area shall, on application, be entitled to a supply on the same terms on which any other company or person in such part of the area is entitled, under similar circumstances, to a corresponding supply." Section 20 enacted that:

> "The undertakers shall not, in making any agreements for a supply of electricity, show any undue preference to any local authority, company, or person; but, save as aforesaid, they may make such charges for the supply of electricity as may be agreed upon, not exceeding the limits of price imposed by, or in pursuance of, the Licence, Order, or Special Act authorizing them to supply electricity."

The Borough Council were the successors in title of the Board of Works of the Hackney District. The scale of prices in respect of which plaintiffs were suing was a scale published in July, 1914: Alternative No. 1.—(*a*) For lighting for any kind of electrical energy used each quarter not exceeding the equivalent of one hour's supply per day at the maximum demand 6d. per unit. (*b*) For any further quantity of electrical energy used each quarter, 1d. per unit. Alternative No. 2.—For any quantity of electrical energy used each quarter 3½d. per unit. For Power: Alternative No. 1.—A fixed charge of £1 per quarter per kilowatt of maximum power demanded, and charge for electrical energy used of ½d. per unit. Consumers paying under this scale are allowed to use 20 p.ct. of the energy consumed for lighting. Alternative No. 3.—For any quantity of electrical energy used each quarter, 1½d. per unit. The effect of this was that persons who consumed electrical energy for light only were charged more for their light than power consumers who also used the energy for light; or, to put it in another way, consumers of energy for power were supplied with energy for light at a lower rate than those who only took the energy for light. In the case of a lighting consumer who in a quarter purchased 300 units per kilowatt, he would pay for 91 units at the rate of 6d., and for 209 units at 1d., which worked out at 2·5d. per unit. The lighting consumer paid 2½d. per unit for his light. In the case of a power consumer who purchased 300 units, he paid a fixed rate of £1 per quarter, and for the 300 units 150d., or 1·3d. per unit. There was in the alteration of the scale issued in 1906 an added inducement to power consumers to take electrical energy from the Council for light at a cheap rate. Another inducement would be to take light also from the Council, which was an "undue preference" to the class of light consumers who were also power consumers.

His LORDSHIP: The Act says you may not give an "undue preference" to persons who take electrical energy for light.

Mr. RUSSELL: Under section 19, where a supply is provided for private purposes, then every person within that part of the area shall, on application, be entitled to a supply on the same terms on which any other person within the area is entitled under similar circumstances to a corresponding supply. A light customer was entitled to a supply on the same terms as a power customer; and to give favourable terms to a power consumer in respect of the light, with the object of inducing him to become a customer, was on the authorities clearly wrong.

His LORDSHIP: You say that a person who takes energy for light is entitled to pay only for his light what another person in similar circumstances would pay.

Mr. RUSSELL said that a man who was paying 2·5d. per unit, if he found another person was getting his supply for lighting and power, was entitled to an equal reduction. Plaintiffs' case was really this—that defendants were supplying energy for light cheap to induce people to take electricity for power. There could be no complaint of their making a higher charge for light than they made for power; but the complaint was for supplying under the name "power" at a cheap rate electricity for light. On May 29, 1905, the Electric Light Committee reported as to the advisability of adopting a special price for factory power supply; the object being to get into the field before the Power Company, and at the Council meeting it was resolved that the report be adopted, though it was not acted upon then. On Jan. 29, 1906, another report was presented by the Engineer as to the existing rate of charges; and it was suggested that a substantial reduction should be made to 3½d. per unit for lighting. The report stated that in the Power Bills of the then session the proposed change gave the right to the power consumer to use 20 p.ct. of the energy supplied in the year for lighting, and went on to say: "We feel that the same concession should be given to our customers for power use." A flat-rate of 3½d. per unit was proposed. A new scale of charge for lighting was then proposed; and it was suggested that power consumers taking the whole of their supply under the maximum power rate might use, for lighting, 20 p.ct. of the total energy consumed. This report was adopted by the Committee, and subsequently a new scale was issued. In the Long Eaton case,* the decision of Mr. Justice Sargant was confirmed by the Court of Appeal; and in October, 1916, a new scale was issued with a slight alteration in the wording—that consumers paying under this scale were allowed to use not exceeding 20 p.ct. of the total energy consumed for lighting, provided "that the whole supply is taken from the same service and meter."

Mr. WALTER said this only expressed what the Council had done the whole way through.

Mr. RUSSELL submitted that the Long Eaton case decided that to charge A less than B to get A as a customer for another supply was illegal within the section; next, that if there were any circumstances affecting A as an individual which would render it less costly than to supply B, it would be justified. But this could not apply to the present case, which was merely a bait held out to a class. The effect of the circular on a customer who was taking energy from the Council for light and power before the change took place—taking light under A and power under B, who was consuming x units for light and 4·8 units for power—was that he made a demand for 5·8 units for power and applied 4·8 for power and 1·8 for light, and paid at a cheaper rate. The person was consuming the same amount of energy for his light; but he was paying half the amount of the rate—in fact, the better a man's load factor the less he was charged. If energy supplied for power by the Council was supplied at a loss, it meant that energy was supplied for light at a scale applicable for power which was produced at a loss. Even supposing it were produced at a profit, the Council were reducing their profit, and defendants were supplying at a load power rate energy which was to be used for the purpose of lighting—a result which could not be profitable. He did not think it necessary to call attention to the correspondence which led up to the action.

His LORDSHIP said he thought the point in dispute was a clean one raised on the sections of the Act.

Mr. RUSSELL agreed. As the power consumers had already got the reduction they were entitled to in the lower rate of charge, he could not understand why they were entitled to a further reduction. Having called attention to the Long Eaton case, and that of *The Attorney-General v. London County Council*, Counsel said the statement of claim alleged that the relators had since their incorporation supplied gas for lighting and other purposes within the limits of their district as from time to time defined; that the defendants, in the exercise of the powers conferred upon them, had at all material times supplied electrical energy for lighting and power purposes within their area. In July, 1914, defendants issued a circular to persons residing or carrying on business within their area, setting forth the scale of charges for lighting—the circular Counsel had already called attention to. The claim proceeded that since the issue of the circular defendants had supplied, and were continuing to supply, electrical energy for both lighting and power to consumers within their area upon the terms offered in the circular. Defendants, in supplying electrical energy upon these terms, were making a charge to consumers who took electricity for power as well as for lighting purposes under (*b*) alternative No. 1., and in thus differentiating the scale of charges between the two classes of consumers were committing a breach of sections 19 and 20 of the Act of 1882. Such differentiation occasioned a hardship to the consumers of electricity supplied by defendants, and was causing loss and damage to plaintiffs, who were ratepayers within defendants' district. By the defence, defendants denied that they differentiated between any customers in such a manner as to constitute a breach of sections 19 and 20 of the Act of 1882, and, alternatively, if by making charges to their customers in accordance with the circular they made a higher charge to those taking electricity for lighting purposes only than to those taking electricity for power as well as for lighting under (*b*) alternative No. 1 in the circular, they did not differentiate their scale of charges between two classes of consumers "under similar circumstances," and they did not commit a breach of either section 19 or 20. Having submitted that plaintiffs were entitled to the relief claimed, the following evidence was given.

Sir *John Snell* (of Messrs. Preece, Cardew, Snell, and Rider, Consulting Electrical Engineers), examined by Mr. COLEFAX, said he had studied the statutory accounts of the Borough of Hackney and the particulars disclosed in the action, and was well aware of the nature of the dispute between the parties. Using the various materials, he had made an investigation to see whether or not defendants had been supplying electricity at a profit or a loss. It appeared that profits had been made on private and public lighting, but losses had been made on the supply for power. By "load factor" one understood the proportion of actual number of units sold by any given amount of plant to the amount which could have been sold if the plant had been working for the whole number of hours in any year. By "diversity factor," if an undertaking were supplying a number of factories or premises, it was necessary to find, in fact, all the maximum loads which were measured by each of these factories if added together representing something more than the actual load observed at the generating station, and the difference in the ratio of actual load at the power station and at the consumers' premises was known as the diversity factor. Speaking broadly, the power users, as contrasted with light users, had a better load as a rule. Diversity factor supply had a much higher value than load factor. The higher the load factor, the lower the cost per unit of production; and the better the diversity factor, the cheaper and better it was for the

* See "JOURNAL," Vol. CXXVI., pp. 51, 130, 511. Vol. CXXVIII., p. 249.

authorities to produce power, as it would result in a lower charge per unit. The statutory accounts for the year 1913-14 gave the maximum load in kilowatts as 5254; the total number of units sold being 8,584,332. The actual cost of producing these units was £49,523, after deducting the cost of repairing street-lamps. The revenue received was £55,432. These figures could be located under three heads—private lighting, public lighting, and power, including factory lighting. There were no means of arriving at the figures from the books of the Council; the units used for public lighting were taken from the published accounts. On private lighting, a profit appeared to have been made of £9000, on public lighting £782, and on power (including factories) there was a loss of £4000. In 1916, the loss had increased considerably, although the profit on private lighting was maintained—in fact, the loss was four times as much, owing to the increased cost of coal. There was no justification for supplying factories with light at a cheaper rate than private houses.

Cross-examined by Mr. Walter: In an electric light station, having regard to the machines, accumulators, mains, &c., the object was to utilize it as much as possible by day as well as by night. It was an advantage to the undertaking to get a day load; and a person who was going to take a day load was a great help to the undertaking as regarded the cost of production. It had always been the desire of station engineers to increase the day load at the station. He would not suggest that the circumstances of a person taking a day load were the same as one taking a night load, or that the one was entitled to more consideration than the other. A person who took energy for many hours was always better for the station than one who took for a few hours. If one had no day load, all the fixed charges were not being met. He was surprised to hear that with a drop of over a million units for lighting, and an increase of six millions for power, the loss on power had disappeared, and that over £6000 was being carried forward in relief of the rates this year. If this were so, the Council had done very well. As the figures for 1916 had not been given to him, he could not speak with regard to them. The cost of coal had gone up about 150 p.ct. recently, and this affected power more than lighting. The price in 1916 for lighting had been advanced 20 p.ct., and for power 30 p.ct. "Per kilowatt demand" meant at the power station, not at the consumer's premises. He did not know that all the public lighting in Hackney was by arc lighting, which was switched off at midnight.

Wednesday, July 18.

Witness, in further cross-examination to-day, said that, speaking generally, as a class the power consumer had a better load factor than the light consumer; and there was a better diversity factor. As a rule, the power users, as a class, used a great deal more electricity than the light user class. All these factors were taken into consideration when fixing the price. In so far as a power user had 20 p.ct. of light, the load factor was slightly worse by this percentage—he had a better load factor and a better diversity factor and output than the light consumer. This entitled them, as a class, to a better price than the light user. The electric undertaking had primarily to determine the price. An ordinary municipal undertaking did not always start at a loss. Until there was a sufficient demand on the station, there would be a loss; but if the station was properly proportioned it would result in a profit. The profit of the undertaking ought to improve as it went on. The time might have been reached when the power charges at Hackney would result in a profit. Energy could not be distributed without loss; and, therefore, he had not charged the whole of the distribution loss to power and lighting. The proper method of dividing distribution loss, which amounted to from 15 to 20 p.ct. of the units, was to charge it to station and consumers' load. Witness was then taken at considerable length through the figures in different tables produced, showing the cost per unit sold as power with light consumers at different load factors, allowing for diversity, and the cost of supplying consumers with different load factors, allowing for diversity factors. It was suggested that, in arriving at the conclusion that the works were being carried on at a loss, witness had omitted to take certain matters into consideration; but he would not admit this, and said his conclusion was based on facts taken from defendants' books and not on pure theory, as he believed their conclusion to be. Witness, after looking at the accounts for 1916, said there appeared to be a steady rise in the load factor, which was what might have been expected. In the Long Eaton case, witness said he appeared for the Electric Lighting Corporation. There a power user was a good load factor, who was charged more if he did not take light than when he worsened his load by taking light. Unfortuuately, at the time, witness did not know all the facts of the case.

Mr. Walter said he had read with some care the evidence given in that case; and he was of opinion that witness gave his evidence most fairly.

Re-examined: Witness said he knew of no special circumstances in the position of factory users so far as they used the power for lighting which would in any way justify the cheaper rate—in fact, it cost more to light factories than ordinary lighting. His own experience was that far more light was used in factories in the evening than during the daytime.

This was the case for the plaintiffs.

The Defendants' Case.

Mr. Walter, in opening the defence, said it was necessary to consider what was the law with regard to the position of electric supply companies in relation to sections 19 and 20 of the Act of 1882. His submission would be that the action was entirely misconceived, founded on entire misconception of section 19 and of the Long Eaton case, which was an authority directly in favour of the present defendants. The "similar circumstances" and "corresponding supply" mentioned in section 19 had to be taken into consideration in seeing whether the person applying for a supply was in the same position as a person who was receiving a supply in the circumstances and facts relating to it. Now what were the facts here? The electric works were started in 1902; and the legitimate aim and object of every electric light company was to obtain as great a use as they could of the machinery which they had installed. The lighting load was normally an evening load; and if it was, the use of the machinery during the major portion of the day would be *nil*, though as some lighting would be required during the day the station had to be kept open and some of the plant running. Therefore, it had always been recognized that taking classes of persons, the circumstances relating to a class of user that had a day load was different to the persons who only had the evening load. Power users were therefore charged on a different basis to lighting users.

His Lordship: That is obvious.

Mr. Walter: Because they are under "different" circumstances and not under "similar" circumstances; the load factor at the station being greatly improved thereby, and the plant can be used during many hours of the day. Continuing, Counsel said that another well recognized fact was this—that a class with a good diversity factor was entitled to be charged on a different scale to persons with the worse diversity factor, in so far as diversity existed, which meant that the peak of one and the valley of another did not apply—the same plant might supply double the amount of energy, as the demand did not exist at the same time. There was another diversity factor—namely where a number of users carrying on different businesses had their demand, *inter se*, so varying from hour to hour that their chief demand did not come on at the same moment. In the Long Eaton case, the facts were these: Power users of over 6000 units were, if they took no lighting or only partial lighting, were charged on a basis of kilowatt demand, *plus* a charge of 1d. per unit; but if they took their whole lighting demand, though it worsened their load factor, they were entitled to obtain their current at the maximum demand rate of ⅜d. per unit. The case was *ex facie* one of undue preference, in which power users, without any corresponding benefit to the supply company, were being charged more if they did not take current for lighting, though their lighting, if they took it, made it worse for the electricity undertaking. This was the principle on which the case was decided—there being a discrimination made without any countervailing advantages to the electric undertaking. It was not suggested in the present case that there was any difference between power users at all; every power user in Hackney was entitled to be served the same as everybody else. Evidence would be given that the supply had never been on any other basis than that set out in the circular of 1916—that consumers paying under the scale were allowed to use 20 p.ct. for lighting factories in which motors were installed.

Mr. Russell pointed out that the allegation in the statement of claim was that since the issue of the circular of July, 1914, defendants had supplied, and were continuing to supply, energy to consumers upon the terms of the circular. This fact being admitted, it was not now open for defendants to go behind it.

His Lordship said he understood Mr. Walter wanted to put in the circular of 1916, to show that they not only did not threaten and intend, but that throughout it had been understood that the factories had not power to supply private dwellings.

Mr. Russell said defendants had admitted the issue of the circular of July, and that the supply was given on the terms therein mentioned. The circular was a clear breach of section 19.

His Lordship thought it better to give leave to amend the pleadings by adding the circular of 1916.

Mr. Walter said there was no discrimination in Hackney between a single power user—every one was entitled to come in on the system and, if he took power for the factory, was entitled to use 20 p.ct. for light. That was to say, he had one supply coming into his works, and 20 p.ct. was the full allowance for factory light—this being the amount inserted by Parliament in Power Bills authorizing the supply of power in areas in which there was already a lighting authority, and Parliament recognized they were entitled to light the factory, and that power and lighting was one definite class of consumers. There was no discrimination among light users. Every one who chose to take it up could have the same scale; and every light user was entitled to have the same scale as power users. It was not even suggested that the circumstances under which a power user was entitled to take 20 p.ct. for lighting the factory was the same set of circumstances as any light user. It could not be suggested, because the load factor and the diversity factor were different. Therefore, he asked, where were the circumstances under which any light user was entitled to ask for light on the scale of power when he had not got power? As was put by Mr. Justice Sargant in the Long Eaton case, the class was intermediate between light and power; and why was this class not entitled to be treated on better terms than a light person only when the load factor and diversity factor were different and the quantity taken different? His suggestion was that the action was wholly misconceived. Whether the power user had light or not was characteristic of the light user. It had been suggested that the case came within the section not by showing that the circumstances were the same, but by raising a wholly fictitious case of an inquiry whether the supply for power paid or not. If it did not, it was a matter for the ratepayers and not for the Court. Once one found the circumstances were different, it was no part of the business of the Court to see whether the price charged agreed or not with the different factors. He craved in aid the principle upon which Mr. Justice Sargant decided the Long Eaton case as being directly in his favour. In the Court of Appeal, the circumstances were accepted as being the same; and in view of the finding of fact, it was held that no differentiation charge could be made—that, having regard to the finding in the Court below, that the circumstances of the two cases were similar, the proposed differentiation was a breach of the Act. There was no doubt that in the present case the circular might have been differently worded. The principle laid down by Mr. Justice Buckley in *Metropolitan Supply Company v. Ginder* was in favour of the present defendants. Then it was said that defendants had also committed a breach of section 20 by showing undue preference; but the Privy Council had decided, in *Attorney General v. Corporation of Melbourne*, that undue preference was an undue preference between persons of the same class, and not of different classes. He would not attempt to deal with all the facts that would be given in evidence, preferring that they should come from the witnesses; but he might mention that he proposed to call evidence to show that the theory upon which the accounts were put forward by Sir John Snell was quite a fallacious one. The

arithmetical deductions might be right, but the basis of the accounts was altogether wrong.

THURSDAY, JULY 19.

His LORDSHIP said the short point between the parties was as to the relative profits, between power and light, made by the electric undertaking during a particular period. Sir John Snell thought that energy for power would be supplied at a less advantageous rate than for light. But did that matter?

Mr. WALTER thought not. His evidence would go to show that there had been a profit on power in 1916-17, and that a loss of over £8000 had been converted into a profit of over £6000, although the lighting load had gone down about a million units. According to the plaintiff's theory, the defendants should now be in the Bankruptcy Court; whereas the fact was they had paid off a large amount of the reserve and were paying considerable sums in relief of the rates.

Mr. *Charles Hesterman Merz* (of Messrs. Merz & M'Lellen), examined by Mr. WALTER, said the cost of supplying electricity varied largely with the conditions under which the supply was given—due, firstly, to the high capital cost in electric supply systems; secondly, to the fact that electricity could not be stored; and, thirdly, to the fact that a large proportion of the operating charges depended rather upon the size of the installation than upon the amount of electricity turned out. The cost decreased enormously as the regularity of the supply increased, and *vice versâ*. The plant must be sufficient to supply the maximum demand. The effect of regularity of supply upon the cost of production was the most important factor. Two hours a day would cover a large number of light consumers. During the summer months the amount of current supplied had been largely affected by the Daylight Saving Bill. He agreed with the definition of load factor given by Sir John Snell. Diversity between two uses of electricity meant that one use took its maximum demand on the plant at a different time to the other. The relation between the sum of the different demands and the result of the demand on the station reduced (because the maximum demand was not at the same time) was the diversity factor. As a general class, in light consumers there was no diversity. There was great diversity in power users; and this was the chief reason why it was profitable, because it was used for the whole twenty-four hours, or because of the diversity between the different motors. A power user, as opposed to a light user, desired to have the highest possible load factor. It affected the wages bill and every other item in factory cost, and was thus reflected back to the station too. He had had considerable experience in connection with power users, having been the Engineer in connection with the Administrative County of London Bill. He was also Consulting Engineer to the North-East Coast group of companies, which turned out about a fifth of the total electricity of the country. With a large number of users for power, the diversity was greater. Electrical energy by the Power Acts was allowed to be supplied for power purposes; and it followed it was also necessary to supply light for factories, and 20 p.ct. was allowed to be used for this purpose. The electrical energy supplied took no notice whether it was supplied for power or light; the result being that in all large power businesses, which every undertaking must seek more and more to supply, the manufacturer would insist on being able to take his energy from one set of wires. One could not control the use of electricity for power or light, even if it was stipulated that the consumer should not use the energy for light. Power users, as a body, were larger consumers than light customers. It was of high importance to a company to obtain power consumers. This was proved by the fact that the undertakings which had gone in for power were increasingly successful, and those which had not had had their profits decreased. He had prepared a diagram showing the actual cost of electricity in Hackney without any diversity factor as being 0·348d. per unit. The fixed charges he put at £8, as against £7 mentioned by Sir J. Snell. He agreed with Sir John Snell that the ordinary diversity factor with power users would be 2 at a low percentage. The power business in Hackney was paying, and did so in 1913-14. The lowest charge was ½d. per unit, and the lowest cost was 0·348d. The fixed charges amounted to £12,000 per annum; and supposing this power had not been sold, the Corporation would have lost £12,000 right off. He had gone into the question of the actual demand with a view of trying to check the diversity factor. As the power business was the one which had a diversity, that was the one class of business whose combined demand could not be got from the consumers' accounts, as they did not know the coincidence of the light demand. The diversity factor of the other business was practically negligible. In order to ascertain the demands of the power users, it was right to take the demands at the station. In trying to get the cost to compare with the price charged to consumers, it was necessary to take the cost at the consumers' terminals. If one took it at the station, too low a cost was obtained. The output at the station was higher than at the consumers' terminals. From the accounts, there appeared to be a loss on the distributing system of 1,164,507 units—314,764 units at the works and show-room, and 126,315 on the accumulators, giving a total of 1,605,887. In ascertaining the number of units sold, one had to deduct from the units generated what was lost on the distributing system. Losses were highest at the peak, because on a direct current system there was no loss on low load, though there was an increasing loss on the high load. The system he had adopted to ascertain the cost was the one usually adopted to get at the rate to be paid by those who took power in the day time. During the period of non-peak load, the losses were less; and it was utterly unfair to charge these losses to the day load. The result of the power business was to put the undertaking in a better position by £12,000 a year.

Mr. *J. A. Jenkins*, Accountant to the Borough of Hackney, said he was familiar with the scale of charges in use. From the time the scale was introduced the practice of the Council had been as stated in the circular issued in October, 1916, for the lighting of factory and workshop premises. The accounts for 1916-17 showed that for lighting 1,825,075 units were sold; for power and factories, 12,465,635 units; and the amount carried forward was £6918, without taking into account £14,691 allowances to employees at the war. The net profit was £5456 after meeting every obligation. The capital to date was about £500,000. A large sum was paid off the capital except in the first two years, and there had been a good contribution to the rates during the period of the working of the undertaking. A reserve of £24,669 had been created up to March 16. There was a deficiency only up to 1902. Owing to the large increase in the cost of coal last year, £6000 had to be debited to reserve.

This was the case for defendants.

Mr. COLEFAX, in replying on the whole case, submitted that plaintiffs had clearly made out a case of undue preference. A circular was put out in 1905 which did not contain the preferential clause as to the 20 p.ct.; and had the matter rested there, it was probable the action would not have been brought. But when the alteration was made giving the option of using 20 p.ct. for lighting purposes, the result of which was that *quâ* lighting, there was a preference given to a man who was minded to take energy for power instead of using gas. On the authority of the Long Eaton case, he submitted plaintiffs were entitled to the relief claimed.

His LORDSHIP said he could not quite follow the reasoning of the Court of Appeal in the Long Eaton case. Why could not the undertaking give a better rate to the man who took a larger quantity than to one who took a smaller quantity?

Mr. COLEFAX said he thought they could legitimately do so.

His LORDSHIP: It seems absolutely dead-against the judgment of the Master of the Rolls if read literally. The Company said if a man takes all his power and light he should have it at ¾d. a unit; but if he only took current for power, it would be 1d. per unit. What is the difference to saying that if you take a larger quantity you shall have the current at a better rate than those who take a smaller quantity?

Mr. COLEFAX said according to the railway cases a company was entitled to differentiate between customers according to what they took; but they must not differentiate between purposes of user in order to induce a man to take current for a particular purpose.

His LORDSHIP intimated that he would take time to consider his judgment; and it has since been stated that it will be delivered to-morrow (Wednesday) morning.

Warrington Wages Arbitration.

The award of the Arbitrator (Mr. W. Addington Willis, K.C.), who recently conducted an inquiry at the Warrington Town Hall with reference to the wages of workmen (not permanent or clerical staffs) in the Gas Department, has now been received. This states that the rates of pay to all able bodied members of the National Union of General Workers of and over the age of eighteen shall be increased by 10s. 6d. per week above the rates existing on Aug. 4, 1914, and the rates of pay to male members under eighteen by 5s. 3d. per week. It is specified in the terms of the award that all advances by way of wages, war wages, and war bonuses, granted since Aug. 4, 1914, shall be merged in this increase, and that the payment of bonuses shall cease. The award and the increase are to operate as on and from April 11, 1917, and payments of advances and bonuses already made since that date are to be taken into account and credited as part payment of the increase. It is further stipulated that the "increase now awarded shall be regarded as war wages, and recognized as due to, and dependent on, the existence of the abnormal conditions consequent on the war."

Welsbach Light Company, Ltd.—At the annual meeting on Thursday, the Directors will report that the net profit for the year ended March 31 (subject to excess profits duty), is £30,512, to which has to be added the balance brought forward of £2040, making together a total of £32,552. The Directors recommend that a dividend of 5 p.ct. per annum be declared on the issued share capital, which will absorb a sum of £8750, less income-tax. It is proposed to carry forward the balance of £23,802, subject to any liability for excess profits duty. The effect of the scheme approved by the High Court some time ago is that the issued share capital is now £175,000 in £1 shares, leaving 90,000 shares unissued in the hands of the Company.

"Coalite" Information Needed.—Last week the "Pall Mall Gazette" wrote: Is it not time for the British Coalite Directors to make an official statement regarding the Company? The shares of the concern, with those of Coalite Ltd., have been hoisted so persistently that an explanation would clear-up a deal of mystery. In the absence of definite news from the Board, all kinds of rumours go round the market. Bearing in mind the history of the two Companies, we cannot do more than warn investors to act cautiously. It may be true that the Barnsley outlook is promising; the bye-products may be giving excellent results; and the talk about the antiseptic output may be correct. On the other hand, there may be a deal of exaggeration in all that is being said and written at the present time. Nothing appears to be known by the public, and for that reason the Directors should make an official statement without delay. The British Coalite annual figures will not be out until next December—a long time to wait; and an early authoritative announcement would be appreciated generally.

Sedgley Gas-Works Employees.—A letter from the Municipal Gas Workers and General Labourers' Union, respecting a war bonus for the gas-works employees, was read at last Tuesday's meeting of the Sedgley Urban District Council, and was referred to a Committee with executive powers. The letter was in these terms: "We think the conduct of your Council something of a scandal. An application was sent in on March 10, and in reply nothing has been received beyond a vague statement that the Council understood the whole question of wages was being inquired into. Whether you suppose a continuance of the inquiry and your procrastination in the matter will enable your employees to meet the ever-increasing cost of living is difficult for us to say. Scarcely any private or public employer with whom we have had trade union dealings has treated us so shabbily as you are doing in this matter. Your workmen are intensely dissatisfied; and we cannot be surprised that they desire our authority to throw down their tools. In the interests of common fairness, we hope you will give this matter your prompt attention."

MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Company was held last Tuesday, at Finsbury House, Blomfield Street, London, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. W. B. Brady) read the notice convening the meeting and the Directors' report, the latter being as follows:

The Company's business continues to be seriously affected by the prolonged war.

The shortage of freight renders it increasingly difficult to maintain the supply of coals at the Company's stations, while the lack of labour, so much felt in England, is even more serious in France.

Coals, freight, and labour have cost considerably more than in the previous year, with the result that the profits of the Company have been materially reduced.

The shareholders, however, are aware that reserves have been set aside in former years to meet unforeseen contingencies; and the Directors are of opinion that these reserves may now, after three years of war, be drawn upon to the desired extent without affecting the stability of the Company. They therefore recommend that a dividend of 5s. per share be paid on Aug. 1 next, making, with the interim dividend paid on Feb. 1 last, 10s. per share, free of income-tax; the balance necessary (£26,173) to make up such dividend being taken from the reserve of undivided profits.

An advance in the price of gas has been sanctioned at several stations; and, mainly on this account, the rental shows, in the aggregate, an increase of 14 p.ct. over the receipts of the previous year.

A very large proportion of the Company's staff abroad is serving at the front. As reported at the last meeting, the Board make allowances to the wives and families in all deserving cases.

The Company's concession for lighting the town of Bolbec has been extended for five years—until 1954—and the average length of the concessions is now 25½ years.

The Directors have to record, with much regret, the death of their colleague, Mr. Henry C. Smith, and of Mr. H. J. Luff, one of the Auditors. Pursuant to the regulations of the Company, the Directors have filled up the vacancies, and have nominated Mr. John Mews as a Director, subject to confirmation by the shareholders at the general meeting, and Mr. G. C. Goldsmid to act as Auditor until the general meeting.

The Directors who retire by rotation are Messrs. H. E. Jones and R. S. Gardiner: and the retiring Auditors are Messrs. J. Reeson and G. C. Goldsmid, who, being eligible for re-election, offer themselves accordingly,

SHIPS COMMANDEERED AND HEAVIER TRANSPORT COSTS.

The CHAIRMAN said it became his duty to move the adoption of the report and accounts. In doing so, he would follow the lines of the report, which, in the first instance, showed how difficult and serious were the ways in which the gas business was affected by the war. He did not think those present who were shareholders in English gas companies would need to be told of these difficulties; and they would realize very well how the anxieties of the Directors and staff here, and especially of the staffs at the works in France, must have been increased, and how heavy the burdens had been to bring the year's operations to the conclusion that they had before them. The difficulties were chiefly enhanced by the trouble of maintaining shipping supplies. The Company had made extraordinary efforts. It had raised capital from the bank—he was bound to say at a time of great difficulty—in order to enable itself to be in a position to ensure a delivery of coals to the French ports. He need not go into the history of what had taken place in connection with vessels crossing the seas. Especially had poor France been marked out for the most vindictive dealing with her fleets. By the great foresight of the Company's Managing-Director (Mr. W. Williams), they had acquired quite a satisfactory and most efficient fleet; but even at the eleventh hour, just before the Directors were meeting the shareholders, when they had on their lips nothing but smiles and encouragement, they had had the portentous information that the Admiralty had commandeered two of their fine boats which were running for them—true at a great cost, but still at a lower cost than if they had had to go out into the market for them. If they had not been running at a lower cost, they would not have had any excuse for incurring the capital outlay. They, of course, realized that the Government had to make provision for their requirements; but in place of these two fine, quick sailing, well-fitted boats—constructed specially for the coal trade—the Company would now have to rely upon the uncertain vessels of neutral countries, for which they would have to pay high rates This, to a certain extent, dashed the cup from the lips of the Directors; and they were not feeling that day so light-hearted as they hoped to have been in meeting the shareholders.

A SMALLER DIVIDEND AND WITHDRAWAL FROM RESERVES.

The profits were materially affected by these changes; and perhaps it would be as well, as they were going to recommend a dividend of 5 p.ct., free of income-tax, if he sketched shortly the position during the three years of war, especially as the report told them they were drawing on their reserves for a considerable part of the dividend. As the war had lasted three years, and as they had accumulated in past times reserves for equalizing their profits to enable dividends to be paid in times of duress, they thought they were fully well advised to recommend the shareholders to take from these reserves, and pay the modest dividend of 5 p.ct. Last year, it would be remembered, they received 7½ p.ct., and on that occasion they had to take from balances of one sort or another the sum of £5470. For the year 1914 they paid the full 10 p.ct., to which they had been accustomed, and the deficiency then was only £1802. They had that day to draw upon the reserves to the amount of £26,000 to pay the moderate dividend of 5 p.ct., free of income-tax.

WAR TIME INCIDENTS AND WORK.

In the midst of all this difficulty, there were some very encouraging features. He was bound to say that the way in which the French towns met their commercial obligations won the praise of everybody with financial experience. He was connected with companies working in countries which, though not actually at war, had been much affecte by it; and he was sorry to say the money from them did not come i as they would like, and had a right to expect. But in France, thoug war was in the country itself, the money did come in, showing wha an honourable, steadfast, righteous nation were these Allies of ours for, while fighting for their ruined and martyred homes in these time they sent the Company the money out of which they could pay the dividends. Bearing upon the commercial rectitude of their Frenc customers, he should like to say that the arrears of rental at the end March, 1914, amounted to £7707; and at the end of March last, th sum was £8285, or only about £580 more than they were before th war. This was striking evidence of what he had been describing t the shareholders. The honourable and rightful way in which thos with whom they did business recognized their commercial obligation filled him with pride and admiration just as did the courageous, en during way in which they were facing their enemies in the trenche and giving them battle. And here he was bound to say their ow officers were loyally helping. A large number of the Company's me were fighting at the front. One of their own officers—M. Cros the Engineer of the Boulogne works—the other day in the field re ceived the great distinction of the Cross of the Legion of Honou The shareholders, he was sure, would convey their congratulations t M. Cros, with those of the Directors, upon this distinction. ["Hea hear."] They had lost Mr. Martin from the London office. He wa going out to the front as an interpreting officer; and they had mad arrangements towards assisting in his expenses, as, he was sure, th shareholders would wish the Board to do, and in a way, they hope that Mr. Martin would regard as being considerate, if not liberal an generous. As the shareholders were aware, the Board made allow ances to the wives and families of the men who went to the front; an this extended as well to the officers. It would also be of interes to the shareholders to know that two of the Company's leadin works had been equipped during the war time with apparatus an machinery for preparing certain munitions of war, with which wor it was the pride and gratification of men like their Directors—Mr Charles Carpenter, D.Sc., Mr. Gardiner, and himself—to be asso iated in this country. They were proud and gratified to know tha in their various works they were assisting, as far as they possibl could, the nation in its hour of peril and in its hour of need for hig explosives and other requisites for carrying on the war. These ser vices had, in a speech made lately, been warmly and particularly eulo gized by Lord Moulton, the Director-General of the High Explosive Department which served the British Army. And he (the Chairman thought the shareholders would be glad to know that in France the Company was doing its share.

ADVANCED PRICES AND NEW AGREEMENTS.

Not only had the French recognized their immediate obligations to th Company in paying for the services the Company had rendered ther fairly and liberally, which enabled the money to come over week b week. Some of the towns the Company supplied had, in obedienc to a legal decision, entered into an agreement (and this without an rancour or ill-feeling on their part or that of the Company) whereb the greater part of their supply of gas now received an advance price, which was a modest amount towards the losses which woul otherwise have been sustained, and which would have extinguished th dividend. In one or two cases they had extended their concessions i the towns in which they worked; the last one before the report was pre pared being Bolbec. The Board were also glad to tell the shareholder that since then the very important and valuable gas-consuming tow of Nantes had likewise agreed to a settlement, by giving the Compan an advanced price for gas and an extended term for their concession At the same time this enabled them to dispose of two or three awkwar and difficult outstanding questions. The Directors wanted to remov the works away from the centre of the town to lower down the river where they had better means of getting in coal. This was a ver anxious piece of work, which had engaged the attention of the Direc tors for some time past, while their Consulting Engineer had bee going into it in detail with the local Engineers. This was a schem that would have to be dealt with very carefully, because, when the destroyed works and threw them out of use, rendering them so t speak obsolete, if they had to meet the outlay by means of fres capital, it would mean a very heavy financial burden; and this had t be reduced by dovetailing in the good of the old works with the develop ing powers of the new ones.

THE BOARD OF DIRECTORS.

During the past half year, they had lost their colleague, Mr. H Chaloner Smith; and as they wished to strengthen the Board especiall from the financial point of view, they had no hesitation in electing Mr John Mews, who was a Director of the Union of London and Smith Bank, with whom the Company had had an account for many years and who had always dealt with them on very reasonable and fair terms He was already a Director of the South Metropolitan Gas Company and was known in the City as a most capable financial authority. Th Board had therefore no hesitation in recommending the shareholder to re-elect him. The older Directors retiring by rotation were Mr Gardiner and himself (the Chairman).

GOOD WORKING, BUT FORCED ABEYANCE OF REPAIRS.

With regard to the accounts, he should like to assure the shareholder that the working of all the stations of the Company was particularl good and satisfactory having regard to the conditions under which the were operating—many of them with insufficient labour, many of ther without the repairs which they would ordinarily like to carry out on larger scale. He wished them to understand that, when the war wa over, repairs would necessitate for some time a heavier outlay than i the past, because it was now absolutely impossible to get either th material or the skilled labour for carrying out any such work.

The DEPUTY-CHAIRMAN (Mr. R. S. Gardiner) seconded the motion which was unanimously carried.

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. JOHN MEWS, a reso lution was passed confirming the interim dividend of 5s. per share, les

6d. per share for duty in respect of all shares held in France, and declaring a final dividend for the year ended March 31 last at the rate of 5s. per share free of income-tax, subject, however, to a deduction for French stamp and transfer duty of 6d. per share in respect of all shares held in France.

Re-Election of Directors and Auditors.

Proposed by the Chairman, and seconded by the Deputy-Chairman, Mr. John Mews was re-elected a Director.

The Deputy-Chairman moved the re-election of the Chairman. He remarked that the Chairman always placed before the meetings of shareholders a descriptive bird's-eye view of the position of the Company in terms that were so easy to understand and so full of local interest that, from that point of view alone, the shareholders must appreciate how fortunate they were in possessing Mr. Jones as their Chairman. And those who had the pleasure of continually working with him knew how much the Company were indebted to him for the ceaseless attention he paid to all the details of the business—keeping himself in constant contact with the Managing-Director, and fully informed of every incident. And he (Mr. Gardiner) might say that in the difficult times through which they were traversing hardly a day passed without some incident or some difficulty for which there was no precedent to assist in guiding to a solution had to be dealt with under the Chairman's orders. He was always ready and eager to help. In addition, and apart from his invariable courtesy, they had the advantage of his great technical and engineering knowledge, and long experience in the profession in which he occupied the foremost place.

Mr. A. T. Eastman, in seconding, also referred to the value of such a combination of qualities as the Chairman possessed in meeting unforeseen and exceptional circumstances that had never arisen before in the Company's history.

The motion was heartily agreed to.

The Chairman moved the re-election of the Deputy-Chairman. He remarked that Mr. Gardiner had the advantage of the other Directors, except the Managing-Director, in being a fluent speaker, not only of his own tongue, but of the French as well; and he had the further great advantage of knowing the whole of the Company's stations from A to Z. He was, too, a member of the Société Technique du Gaz, and was (so to speak) as well known in Paris as in London. Coupled with this was the fact that Mr. Gardiner had occupied some of the offices in gas administration that he (the Chairman) had himself occupied; and he was now the Chairman and Director of certain important British and Continental companies.

Mr. Charles Carpenter, D.Sc., seconded the motion, which was unanimously carried.

On the proposition of Mr. G. E. P. Hodge, seconded by Mr. Frank H. Jones, the Auditors (Messrs. Joseph Reeson and G. C. Goldsmid) were re-appointed.

Well-Earned Recognition.

The Chairman said they must recognize the services of the staffs in London and abroad, and pass to them a vote of thanks for their efficient services during the past year. This was really a very important vote, because where the Company would have been if it were not for their present officers during the past year and the years before, with the London staff depleted, he hardly knew. The London staff was almost as essential as the staffs abroad, although there was a broad distinction on the side of the men who were making gas and rubbing shoulders with their customers. With regard to their Managing-Director (Mr. Williams), he was sure the shareholders could appreciate, at a time when most foreign companies were passing their dividends altogether or paying dividends of much impaired amount, what they owed to Mr. Williams. He was glad to tell them the Directors had recognized this in a manner which he thought Mr. Williams would consider was fair if not liberal. As to Mr. Brady and Mr. Heather, the Auditors could tell them that the work of the office and the books went like clockwork. Having again mentioned Mr. Martin's departure for the front, the Chairman turned to the stations abroad. He said that M. Gautier, at Havre, had just accomplished his fiftieth year in gas service—though not all in this Company—and so the Directors had passed a vote recognizing the event and his services, and had sent him a handsome testimonial, which he had acknowledged with great gratitude. With regard to the rest of their officers, Captain Cros had earned the Cross of the Legion of Honour. M. Huon, who had been managing the negotiations for the increase of the price of gas and the extension of the concession at Nantes, was an accomplished officer. M. Coudelou, of Rouen, was a very hard-working and faithful officer. MM. Bertin and Defoy were doing their best in these troublesome times. How very anxious and troublesome these times must be when the issues of the war meant so much to them and their families the shareholders would realize. While their officers were devoted to their own country and to the Company, they were at the same time in hearty sympathy with the struggle through which this country was passing.

Mr. R. S. Gardiner seconded the motion, which was cordially passed.

The Managing-Director (Mr. W. Williams) said, on behalf of all the members of the staff here and abroad and for himself, he thanked the shareholders most heartily for the vote they had passed. As the war continued to drag on, the shareholders quite understood the difficulties increased rather than decreased; and it was a great comfort to the Company's officers to know that their efforts were appreciated so thoroughly by the shareholders, and that they continued to enjoy their sympathy and support. He was sure that, when the vote was communicated to the Managers and staffs abroad, it would be appreciated as much by them as it was in London.

On the motion of Mr. Reeson, seconded by Mr. Hodge, a vote of thanks was also passed to the Chairman and Directors.

The Chairman heartily acknowledged the vote.

Berwick Gas Company.—It was reported at the annual meeting of the Berwick Gas Company that there had been a serious decrease in the sale of gas owing to the Summer Time Act and the dull state of trade. A dividend of 7 p.ct. was declared, against the usual 10 p.ct.

MALTA AND MEDITERRANEAN GAS COMPANY.

Previous Results Well Maintained.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, Nos. 59-60, Gracechurch Street, E.C.—Colonel Stephenson R. Clarke, C.B., in the chair.

The Acting-Secretary read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The Chairman, after expressing regret at the absence from the meeting owing to ill-health, of Colonel Daniell, went on to remark that since the shareholders had met a year ago the Company had passed through a period of considerable and increasing anxiety; and it was with considerable relief that the Directors saw, when the accounts were returned by the Auditors, that there was not a large difference between the results of the past year and the previous one. They started the year with a considerable increase in consumption; but as the freights for steamers were rising steadily against them, the Directors found that it was necessary to considerably increase the price of gas, with the natural result that the growth in demand was checked. During the latter months of the past year, there had even been a decrease in the consumption. The Board were fortunate in being able to hit upon a figure for the price of gas which had, in the result, balanced the extra costs to which the Company had been subjected. Needless to say, it was with great regret that the increase in price was made to the consumers; but the Directors were forced to it by circumstances. It was the only way by which the business could be conducted at a reasonable profit; and it would be a great relief to them when a fall in the rates of freight again enabled the Company to sell gas at a cheaper price. Touching upon the changes of the past year, he pointed out that Mr. W. A. Reid, their Engineer at Malta, after fifteen years' service with the Company, had retired, and the Directors had elected as his successor Mr. A. E. Buckley, who was for many years Engineer to the Holmfirth Gas Company. With regard to the accounts, the Chairman then proceeded to call attention to the greater differences between last year and the preceding one. Coals had cost £50,851, against £32,631 a year ago; and oil £4283, against £480. This left them with £22,000 to pull up. The sale of gas had brought in £50,642, against the previous year's amount of £37,520. Coke which a year ago produced £17,512, had now given the remarkable figure of £27,267; gas and coke together yielding £77,000, against £55,000 last year. Thus the sum of £22,000 deficient was exactly made up. The small increase in profis made on the sale of coal and tar had been more than covered by the loss in exchange from the Sicilian stations. This amounted in the year to the heavy figure of £3488, against £1197. This was partly caused by the increase in the rate of exchange, and partly by the larger sums that had been remitted from the stations at Trapani and Marsala; the Municipalities there having during the past twelve months considerably reduced their indebtedness to the Company. As to the future, he had just been alluding to the Sicilian stations; and he would continue his tale with regard to their expectations from them during the next twelve months. The story was soon told, for the Italian Government had taken them over for the duration of the war; and they would bring in no profit to the Company, nor would they be any expense. They were to be run at cost price; and the Company relied upon the fairness of the Italian Government that a sum would be allowed to the Company for amortization purposes. The supply of coals to these stations, and the price to be charged for gas and coke, would, until the war was over, remain the exclusive concern of the Italian Government. Now with regard to Malta. The great anxiety from first to last during the whole of last year, and for the ensuing year, had been, and would be, the supply of coal. Not that there was any difficulty in procuring coal on this side. The question was simply want of ships. It seemed impossible to tempt shipowners to risk their steamers on the voyage there; and for some time the Company had been unable to send out a cargo. For the last parcel of coal delivered there, they were indebted to the kind offices of the Admiralty, who informed them of a steamer going out; and they were enabled to purchase a portion of her cargo at £6 5s. per ton. The coal turned out quite suitable for gas making, and they were very glad to get it, and grateful to the Admiralty for their information. He concluded by moving the adoption of the report and accounts.

Mr. A. M. Paddon seconded the resolution, which was carried unanimously without discussion.

It was then agreed, on the proposition of the Chairman, seconded by Mr. A. F. Phillips, that dividends be declared at the rate of 7 p.ct. on the first preference shares, 7½ p.ct. on the second preference shares (less income-tax), and of 6 p.ct. on the ordinary shares (free of income-tax)—deducting the interim payments already made.

The Chairman, proposing the re-election of Mr. Phillips as a Director, said the Company were peculiarly indebted to that gentleman, not only for the benefit of his personal experience, but for a great deal of work which had been carried out in his office, and which in these days of shorthandedness, owing to the war, could not otherwise have been got through. The Directors felt such a sense of gratitude to Mr. Phillips in this matter, that at the next meeting they would ask the shareholders to give him a small extra honorarium for the services thus rendered by his staff, and for the use of his offices.

Mr. Paddon seconded, and said that without the experience Mr. Phillips had freely given through his staff they could not have surmounted many of the difficulties by overcoming which they had been able to present the favourable statement now before the meeting.

Mr. E. L. Burton supported the motion, which was carried.

Mr. Phillips, in acknowledgment, said, with regard to the special services which had been alluded to, that what he had done he did without the slightest idea of receiving any compensation, such as was suggested by the Chairman.

On the proposition of Mr. F. R. Smith, seconded by Mr. C. Webb, the Auditors (Messrs. Burton and Cash) were re-appointed.

The Chairman, Directors, and staff were thanked for their services before the shareholders separated.

MANCHESTER CORPORATION GAS UNDERTAKING.

Annual Report and Accounts.

The following information and figures are taken from the report and accounts of the Manchester Corporation Gas Committee for the year ended March 31, a copy of which we have received from the Superintendent (Mr. Fredk. A. Price).

Income and Expenditure.

The income from the sale of gas for the past year was £688,095, and from residuals (including £21,226 from recovery of toluol, &c.) £313,370; the figures for the preceding year having been respectively £681,457 and £253,640. Adding sundry receipts, the total income reaches £1,002,570, as against £935,843. On the other side, the expenditure was £852,758, compared with £744,948; the gross profit for the year being £149,812, whereas twelve months ago it was £190,895. Deducting the amount (£56,032) paid for interest on loans, &c., a net profit of £93,780 is arrived at; the corresponding figure twelve months ago having been £141,234. The net profit has been appropriated as follows: Excess appropriation of £53,951 being carried forward to next year's account; deficit from last year's account, £34,009; sinking fund for redemption of loan debt, £61,047; city fund in aid of rates, £50,000; applied in extension of works where borrowing powers are not granted, £2675—total, £147,731.

The quantity of gas sold was 5,561,137,000 c.ft., a decrease of 2·44 p.ct. on the corresponding figures for the previous year; and the average price realized was 2s. 5·42d. per 1000 c.ft. The cost of coal and oil per ton carbonized was 18s. 1·39d., as against 14s. 9·6d. for the previous year; while the income from residual products rose to 12s. 5·71d. per ton, as compared with 10s. 0·06d. These figures represent an increase of 10·14d. per ton in the net cost of raw material, which on the carbonization of 502,377 tons amounts to £21,225.

The amount payable for income-tax for the year, according to the assessment, was £44,323, of which sum £9416 was recovered by deductions from interest payable on loans and stock, &c. There was also credited the sum of £21,443, being the amount refunded by the Finance Committee consequent upon the arbitration to determine the incidence, having regard to the Leeds judgment, of the income-tax payable by the Corporation. The net charge against the department for the year was thus £13,464. An appeal, however, is pending under section 13 (1) of the Finance Act, 1914, Session 2, on the ground of reduced profits owing to the war, which it is hoped will result in a considerable sum being credited to next year's account.

The amount transferred from revenue to the credit of the renewals account is £69,768, which, together with the interest on the fund, makes a total credit for the year of £74,129. The sum of £60,735 has been expended during the year. The balance to the credit of the account is now £158,753.

Additional loan capital to the extent of £10,000 has been raised during the year. The expenditure for the year amounts to £15,719. Of this sum, £2675 has been provided out of net profits, and the balance out of loans. The total capital outlay at March 31 last was £3,099,346, the loan debt in respect of which was £911,448. The balance of sinking fund not actually applied to the redemption of debt at the same date was £44,013.

Price of Gas.

The Committee regret that, owing to the increased cost of oil and other materials and of the war bonuses to employees, they have been compelled to recommend an advance of 6d. per 1000 c.ft. in the price of gas to all consumers. This advance, together with that approved by the Council on May 5, 1915, makes a total increase in the price, consequent upon the war, of 1s. per 1000 c.ft. The recommendation was approved by the City Council on May 23 last, and the new scale of charges, which took effect as from the readings of the meters for the June quarter, is as follows:

Gas consumed on one premises per quarter.	Price Within the City.	Price Without the City.
	Per 1000 c.ft. s. d.	Per 1000 c.ft. s. d.
Ordinary Meters—		
Under 250,000 c.ft	3 2	3 5
250,000 and under 1 million	3 1	3 4
1 million and under 2 millions	3 0	3 3
2 millions ,, 3 ,,	2 11	3 2
3 ,, ,, 4 ,,	2 10	3 1
4 ,, ,, 5 ,,	2 9	3 0
5 ,, and upwards	2 8	2 11
Gas Engines—		
Under 1 million c.ft.	2 9	3 0
1 million and under 2 millions	2 8	2 11
2 millions and upwards	2 7	2 10
All these prices are subject to a discount of 2d. per 1000 c.ft. for payment within one month.		
Public Street Lamps	2 6	2 9
Automatic Meters—		
Cubic feet per penny	25	23
These prices are net.		

The War.

At March 31, 826 employees had joined His Majesty's forces. The Committee record their deepest sympathy with the relatives of 59 employees who had made the supreme sacrifice. There are 108 employees at present engaged in the department who have served during the war in either the army or navy, but have been discharged on account of wounds and various other reasons. At March 31, 100 women were employed as clerks and meter readers, and 71 as manual workers.

The amount standing to the credit of the war benevolent fund at March 31 was £701. The officials of the department voluntarily contribute to this fund, thereby showing in a practical way their sympathy with the dependants of fallen colleagues or with those who have been incapacitated through service with the colours. A number of cases have been relieved during the year. The Committee of Management hope to maintain the fund without appealing to the Gas Committee for financial assistance.

In accordance with the resolution of the Committee, gas is still being supplied to the Belgian Hostels and the Red Cross and Voluntary Military Hospitals at one-half the usual price. This concession costs the Committee about £1000 per annum.

The war bonuses payable at March 31 were:—

	Per Week. s. d.
Shift-workers (including Sunday)	8 7½
Day-workers	7 6
Distribution department	6 6
Clerical, collecting, and inspection staffs up to £300 per annum	6 6
Tradesmen—according to the various trade rates	—
Women and Youths	3 3

Summer Time Act, 1916.

There was an estimated decrease of 110 million c.ft. in the consumption of gas owing to the operation of the Summer Time Act from May 21 to Oct. 1. The decrease is equal to 1·8 p.ct. on the annual consumption. The Act operates this year from April 8 to Sept. 17.

Gas-Heated Furnaces.

To promote and further the use of gas for industrial and manufacturing purposes, two gas-furnace demonstrations have been held during the year at the Whitworth Street Depôt. Representatives of a large number of important engineering firms attended and took advantage of the facilities offered for testing materials and making experiments with various types of furnaces. A third demonstration will shortly be made. A fully-equipped and permanent furnace-room is in course of completion at the Whitworth Street Depôt; and it is intended to offer continuous facilities for testing and experimenting with all makes of furnaces and other heating appliances.

Statistical.

The following particulars are furnished as illustrating the growth and working of the department during the year:

	Year 1916.	Year 1917.
Manufacture—		
Material carbonized—tons	507,012	502,377
Gas made—Thousands cubic feet	6,067,751	5,901,971
,, per ton—cubic feet	11,968	11,748
Calorific value, B.Th.U. (gross)	539	519
Coke available for sale—cwt. per ton of coal	11·18	10·85
Tar made—gallons per ton of coal	12·23	11·17
Ammoniacal liquor made—10 oz.—gallons per ton of coal	30·20	30·75
Distribution—		
Mains—Miles laid	992¾	994
Output of gas—Thousands cubic feet	6,067,094	5,902,652
Gas sold ,, ,, ,,	5,700,014	5,561,137
Gas unaccounted for (adjusted) ,, ,,	194,673	179,885
,, ,, ,, per cent. on output	3·21	3·05
Total number of consumers (including automatic)	190,956	192,886
Number of automatic consumers	74,506	77,725
Gas sold to automatic consumers—Thousands cubic feet	998,880	959,541
Gas cookers and fires:—		
Number fixed and owned by Committee—		
Cookers	86,137	89,957
Grillers	37,661	37,794
Fires	20,511	23,049
	144,309	150,800
Gas consumed (estimated)—		
Cookers and grillers—Thousands cubic feet	1,083,500	1,129,500
Fires—Thousands cubic feet	235,000	270,500
Per cent. of consumers with cooker, griller, or fire	76	78
Private Lighting—		
High-pressure lamps	1,016	1,076
Low-pressure lamps	1,025	990
Burners maintained	24,984	26,674
Public street lamps—		
Within the city	21,442	21,304
Without the city	1,421	1,419
	22,863	22,723

Public street lighting restrictions: There was a decrease in the quantity of gas supplied for the public lamps of 74,857,000 c.ft., equal to 1·27 p.ct. on the output.

Extension and Renewal of Works.

Bradford Road Station.—One-half of the reconstructed No. 1 retort house, equal to thirteen settings of horizontal "through" retorts, ten retorts to a setting, has been completed and put to work during the past winter. A power-house containing two 200 kw. Browett and Lindley dynamos and engines combined is nearing completion, which will ultimately provide power for the electrical machinery in various parts of the works. A railway connection is being constructed between the railway sidings and the works, by means of an inclined road. This work has made good progress during the past few months, and is expected to be ready for use during the coming winter. A small pump house, containing six pumps (driven by electricity), has been erected for dealing with tar and liquor; but owing to the shortage of labour it has been impossible to put the plant into operation.

Droylsden Station.—The No. 1 vertical retort setting has been rebuilt during the year.

High-pressure Mains.—High-pressure mains varying in diameter from 2 to 9 in. have been extended during the year; for the purpose of street lighting and private consumers. The total length now laid is 12½ miles 174 yards.

GENERAL.

The Government are still being unreservedly assisted in various ways by the department.

The Committee deeply regret to record the loss by death, after a long illness, on Dec. 16, 1916, of their Deputy-Chairman, Alderman Thomas Hassall, J.P., who had been an active and valued member of the Gas Committee for 18 years, and was held in high esteem by his colleagues.

MR. PRICE'S STATISTICS.

Mr. Price has again brought up to date the statistics compiled by him, which indicate at a glance the position of the undertaking in every resspect as compared with the previous twenty years. The excess of assets over liabilities is shown to be £2,319,247. Capital charges amount to 4·54d. per 1000 c.ft. of gas sold, and the net profit to 4·05d. The production of gas per ton of coal carbonized was 11,748 c.ft., of a calorific value of 519 B.Th.U. gross. The following is the appropriation of net profits from 1844 (the year in which the works were taken over by the Corporation) to March 31 last.

Paid over to Improvement Committee for improvement purposes, 1844 to 1887 inclusive . .	£1,367,641 8 11
Paid over to Water-Works Committee (one moiety of profits from 1852 to 1861 inclusive). . . .	166,265 4 7
Cost of street lighting from 1879 to 1891 inclusive, borne by the Gas Committee	329,201 13 2
Paid into City Fund, 1888 to 1917 inculusive . .	1,454,066 5 7
Total amount applied in lieu, or in aid, of city rates	£3,317,174 12 3
Total cost of land, buildings, and plant to March 31, 1917	£3,099,346 14 1

On this occasion, Mr. Price has introduced a new table, which shows how the day consumption is growing as the result of the extended use of cookers, furnaces, &c. Whereas in 1908 the day consumption was 32·92 p.ct. of the total, for the past twelve months the proportion had grown to 45·31 p.ct.

BIRKENHEAD GAS-WORKS RESULTS.

In the statement of working results which accompanies his analysis of the accounts for the year ended March 31 last, Mr. R. H. Brown, the Gas Engineer to the County Borough of Birkenhead, says the quantity of gas sold during the year was 917,413,000 c.ft., which was a decrease of 11,180,000 c.ft. The decrease in consumption up to Dec. 31 was very much greater than this; but the unusually wintry nature of the March quarter greatly assisted in reducing the decreased consumption—the increase on that quarter alone being equal to 10·5 p.ct. This increase, together with the whole year being affected by an increase in the price of gas made in June, 1915, led to an increase in the gas-rental of £4406, though this was considerably off-set by the decrease in public lamp consumption of £3623.

Residual products show an increased revenue of £9639, compared with the previous year, principally due to the improved prices of coke; and this return should have been even better, but for the fact that in the early part of the year one or two old contracts at low prices were still being carried, and the low prices paid by departments of the Corporation. The old contracts are now finished, and improved prices have been obtained from the other departments. Tar brought in less during the year, in consequence of the difficulty of disposal of pitch; and ammoniacal liquor also brought in considerably less, owing to the new prices which had to be accepted from the sole buyer.

On the expenditure side, coal cost an average of 21s. per ton, against 18s. 2d. per ton the previous year, in which the arrears of several old contracts were being worked off. This increase in price on the average quantity of coal used (neglecting the increased coal used in place of carburetted water gas manufacture) amounted to £5600. The increase in the rate of income-tax from 3s. to 5s. in the pound accounts for £3221 out of the £8053 paid, apart from the increase due to larger assessable profit. Increases in wages granted during the year amount to approximately £2000. These sums, together with the £919 expended out of revenue on capital account, make the total increased charges of £11,812 against profits. The cost of all materials for maintenance and other purposes was also considerably higher, which further decreased the available surplus.

The total gas made during the year was 1,010,917,000 c.ft., a decrease of 3,954,000 c.ft., equal to 0·39 p.ct. The coal used amounted to 67,656 tons, against 54,947 tons in the preceding year; but no carburetted water gas was made for five months, in order to economize the oil and coke, which accounts for the increased coal used. The make of gas was 12,466 c.ft. per ton of coal, against 12,143 c.ft., an increase of 323 c.ft. per ton, effecting a saving of 2350 tons of coal. The total coal gas made was 843,259,000 c.ft.—the balance being made up of carburetted water gas. The coke sold per ton of coal equals 11·45 cwt., against 10·2 cwt., an increase of 1¼ cwt. per ton. The tar made—13·95 gallons per ton of coal—compares with 14·5 gallons, a decrease of 0·6 gallon; and the liquor made equals 29·91 gallons of standard strength, compared with 30·8 gallons. These are all good standard figures; the make per ton and the coke sold per ton being a record for these works.

The attention of the Committee is directed to the figures with reference to distribution, from which it is seen that, in the matter of cooking-stoves, the department is approaching saturation-point in proportion to the number of consumers, and that stoves are a decided asset in the consumption of gas apart from the other business done in them. As to the future, it is to fires and hot-water apparatus that the department must look for a further increase of business.

Relations with employees have been amicably maintained during a very difficult and strenuous year; and it has been largely due to the wholehearted co-operation of the staff and employees that the results have been kept at the present standards, at a time when extraordinary charges have to be met, and all sources of expenditure and income carefully watched.

GAS PROGRESS IN DUNDEE.

[From a Scotch Correspondent.]

An examination of the accounts and statistics of the Dundee gas undertaking reveals remarkable progress. The undertaking was acquired by the present owners—the Dundee Gas Commissioners—in the year 1868. The price charged for gas then was 5s. 4d. per 1000 c.ft. During the next few years it was gradually reduced to 4s. 2d.; but in 1873-4 it was raised to 6s., which represents the high-water mark as regards price. From that year until 1883-4 the price fell by stages to 3s. 6d., at which it remained until 1886 7, when it was put up to 3s. 10d. In 1900-1 the rate was again 3s. 10d., the price in the interval having fluctuated between that figure and 3s. 2d. The next year the charge was reduced to 3s. 6d., whence it steadily dropped, until in 1911-12 it was only 2s. 2d. At this price it remained for four years, when abnormal expenses due to the war compelled an increase to 2s. 9d.

The quantity of gas made in 1869-70 (the first complete year) was 200,838,000 c.ft.; in 1916-17, it was 1,104,038,000 c.ft.—an increase in 47 years of 449 p.ct., or an average annual percentage of 9·5. This is a record on which any gas undertaking might legitimately plume itself. In the 35 years from 1869-70 to 1904-5 the average annual increase in the quantity of gas made was 13,793,000 c.ft. During the twelve years that have since elapsed, the average was 35,035,000 c.ft. This growth is so rapid and striking that one seeks among the Commissioners' statistics for a cause. It appears to be found in the fact that in 1905-6 they adopted, on the recommendation of their present Engineer (Mr. Alexander Yuill), what has been tersely described as the "forward policy." They decided that is, that they would not wait while their consumers were slowly discovering the advantages of gas for cooking and other domestic purposes, and were weighing and balancing the arguments for and against hiring the necessary appliances, but would, in a spirit of brave confidence in their commodity, brush-away all restrictions, and offer to supply on free loan gas-cookers, hotplates, grillers, and gas-rings. On April 30, 1905, the cookers on hire numbered 2264; on May 15, 1917, the number on free loan was 14,315, and there had also been supplied on the same terms 1753 hotplates, 4544 grillers, and 10,110 boiling-rings—a grand total (in more senses than one) of 30,722. These good results spurred the Commissioners in 1909·10 to take another step; they determined to supply on hire gas fires, radiators, and geysers, of which there are now 11,613, 1807, and 107 respectively. This, then, is the main cause of the development of the undertaking since 1904-5, and of the reduction in price from 2s. 10d. to 2s. 2d. per 1000 c.ft.

During the past decade, the quantity of gas made per ton of coal used has risen from 9627 to 11,579 c.ft. The annual figures are as follows:

1906–7	9,627	1912–13	10,829
1907–8	9,387	1913–14	10,926
1908–9	9,849	1914–15	11,024
1909–10	9,702	1915–16	station meter defective.
1910–11	10,446		
1911–12	10,876	1916–17	11,579

The practical effect of this improvement is seen when it is stated that if in 1916-17 the quantity of gas made per ton of coal had been the same as in 1906-7, about 18,700 additional tons of coal would have been required, costing, at 20s. 2·63d. per ton (the average price given in the Commissioner's statistics for last year) no less than £18,900.

In the year 1869 70, nearly one-fourth (24·25 p.ct.) of the gas made was unaccounted for. This high percentage was brought down to 10·66 in the year 1883-4. In 1886-7 it fell to 7·91, and from then to 1916-17 the average works out at 7·88. It is rather high, but probably some special local conditions account for it.

The charges for annuities, interest, sinking fund contributions, &c., have come down from 1s. 2·32d. per 1000 c.ft. of gas made to 6·85d. in the year 1914-15. War conditions caused a rise in 1915-16 to 7·67d., and in 1916-17 to 8·06d. This is a low rate for an undertaking acquired from a private Company. It indicates that great discretion has been used in the matter of extensions, and that a wise policy has been adopted in regard to the allocation of expenditure as between capital and revenue. The total amount expended on capital account at May 15 last was £798,158, which is equal to £723 per million cubic feet of gas made.

The loss in bad debts in 1869 70 was 20s. 6d. per £100; last year, it was 7d. The record is held by the year 1913-14, with the extraordinarily low figure of 5d. No doubt the facts that 5 p.ct. discount is allowed for prompt payment of gas accounts, and that almost exactly one-half of the Commissioners' 51,832 consumers take their supplies through prepayment meters, partly account for this excellent result; but even after making due allowance for these things, the figure is highly creditable to the financial department.

The Commissioners' accounts are stated with clearness; and the statistical statements at the end of them are useful and interesting. But why is the usual method of placing credits on the right and debits on the left reversed?

Quality of Brentford Gas.—The Heston and Isleworth District Council report that complaints have been made as to the poor quality of the gas at present supplied by the Brentford Gas Company, and they have been urged to make some representation to the Company in the matter. The Council proposed to send a letter to the Company directing attention to the low calorific value of gas now supplied, and to send a letter to all Urban District Councils within the area supplied by the Company, informing them of the representation made as to the quality of the gas, and urging them to take similar action.

THE ASHTON CHEMICAL EXPLOSION.

Dismantling at Ashton Storage Station.

Excellent progress is being made at Ashton-under-Lyne with the work of dismantling the two gasholders wrecked by the decent disastrous explosion [see "Journal" CXXXVIII., pp. 586, 620, 621]; and, given fine weather and freedom from labour difficulties, the Contractors (Messrs. R. & J. Dempster, Ltd., of Manchester), are hopeful of having one of the holders ready by October. Although the task is an unusually ugly one, they have tackled it with spirit and enthusiasm—an enthusiasm which is shared and appreciated by Mr. Joseph Townsley, the Engineer and Manager of the Ashton Gas Company, who, with his increasing consumptions, will be in an anxious position until he can get one of the holders going again.

An interesting fact has come to light with regard to the contention of Mr. Townsley that portions of the chemical plant were blown right through the holders, for parts of the still from the chemical works can be seen inside the holder that is dry.

Both the new holders will, it is understood, be spiral-guided.

Renewing the Dukinfield Plant.

A full supply of gas has been available at Dukinfield for some time now—thanks, largely, to the energy of Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, who had gangs of men and quantities of material on the job with commendable celerity and dispatch soon after the explosion. The records at Dukinfield—as verified by Mr. William Lindley, the Engineer—show that gas-making ceased at 4.24 p.m. on June 13, and that the supply was renewed at 10 a.m. on July 3; no mishap of any kind taking place when the gas was turned on to the town supply. Besides repairing No. 2 holder and rendering it fit for gas making in so short a time, the Contractors have been engaged in putting new steel roofs over Nos. 1 and 2 retort-houses—their predecessors having been so badly dented and perforated by flying portions of the chemical works plant that it was necessary to practically dismantle them. The engine-house, meter-house, purifying-house, and other parts of the works have also received attention at their hands.

The contract for the new double-lift holder (to replace No. 1 holder) was, as previously stated in the "Journal," let within forty-eight hours of the explosion. This work has been entrusted to Messrs. Newton, Chambers, & Co., Ltd., of Sheffield, who are hopeful of completing it in four months.

ALLOA GAS DEPARTMENT.

The financial statement for the past year was submitted last week to a meeting of the Town Council by the Convener (Bailie Henderson). The total income was £24,715; and the expenditure, £18,398—leaving a gross profit of £6318. The sinking fund amounted to £2594; and interest to £1719; property and income-tax, £1196; and bad debts, £16—leaving a net profit of £793.

It was agreed to write-off in the sinking fund account an additional sum of £700. It was stated that with the present rate of payment to the sinking-fund the whole debt of the undertaking was being written-off in 13½ years. The capital cost of gas-cookers has already all been written-off. The quantity of gas sold increased by 3½ million cubic feet. The coal carbonized was 11,209 tons; gas per ton of coal for the year, 14,013 c.ft., compared with 12,800 c.ft. for the previous year—the former figure having been obtained by suitable steaming in the vertical retorts. The coke saleable was 10·57 cwt. per ton of coal carbonized; tar, 16·38 gallons; sulphate of ammonia, 29·80 lbs.

An estimate of income and expenditure was submitted for next year, showing a net profit of £723. It was agreed to continue the present rates for gas—viz., 2s 5d. for lighting and 1s. 8d. to 2s. 2d. for power.

WAGES ARBITRATION AT THE BURY GAS-WORKS.

The Multiplicity of Trade Unions.

The gasworkers employed at the Bury Corporation undertaking are divided into two camps for trade union purposes—three-fourths of the men being members of the Bolton and District Gasworkers' Association, and one fourth the Municipal Employees' Association. Unfortunately, however, the two Unions have not in the past acted jointly in the matter of war wages and war bonuses; and the result has been confusion of purpose all round. An effort to clear the air was made last Thursday by the Chief Industrial Commissioners' Department—Mr. Vesey Knox, K.C., M.P., opening arbitration proceedings in the Council Chamber. The Gas Department was represented by the Town Clerk (Mr. J. Haslam) and Mr. H. Simmonds, F.C.S., the Engineer and Manager.

It was stated at the outset of the proceedings that early in the year the Gas Committee received a deputation from the Bolton Gasworkers' Association only; and the Association accepted an advance of 3s. a week as war wages. The Municipal Employees' Association protested against the Gas Committee declining to receive a deputation from them, and passed a resolution to call the attention of the Chief Commissioners' Department to the "inequality." In May, the Bolton Association applied for a further advance of 6s., and (after an arbitration held with regard to the wages of gasworkers at the Farnworth and Kearsley undertaking) they agreed to accept the award of 4s. No agreement having been come to regarding the war wages of Municipal Employees' workmen, these arbitration proceedings followed.

Mr. P. J. Tevenan, the General Secretary of the Union, in submitting their case to the arbitrator, said they desired an increase of 7s. a week, on the ground that the cost of living had increased since the last grant was made. They thought the application was justified. The Ministry of Munitions had granted an all-round increase of 12s. to men in certified trades; and they thought they were entitled to a similar increase.

The Town Clerk pointed out that the Gas Committee had dealt with the Bolton Gasworkers' Association, who represented the majority of the employees at the Bury Gas-Works, and they had accepted 4s. This amount had also been accepted by the gasworkers employed at the Radcliffe and Pilkington works, and at Farnworth and Kearsley. The majority of the Bury men had accepted the increase to date from March 28; and he contended that it was unreasonable that another Union, representing the same class of workers, should come and ask for an amount over and above what the majority were prepared to accept. Many of the men represented by the Municipal Employees' Association were old men, between 60 and 70 years of age, and they were not justified in asking for such an advance for the old men.

Mr. Tevenan, in reply, said there were not many old men employed at the works; but the old men who were there were old servants of the Corporation. As to the majority having accepted the Farnworth award, out of 131 employees in the Gas Department 54 were in favour of acceptance and 36 against. Those who accepted the award were not all members of the Bolton Gasworkers' Association—seven or eight Unions being represented in the gas-works. Every Committee of the Corporation except the Gas Committee recognized the Municipal Association.

Mr. Vesey Knox asked why the two Unions could not act jointly in the matter; and he was informed that the Bolton Association had refused to work with the Municipal Association. The position had also been complicated by the attitude of the Bury Gas Committee in declining to recognize the Association.

In the result, it was announced that the Committee on Production having recently awarded 3s. all-round to men in certified occupations, it was agreed that this should be taken into consideration in the present arbitration; and the representatives of the men agreed that they would make no other application for six months from the date of the award.

STOURBRIDGE GAS-WORKS REPORT.

In his twelfth annual report, dealing with the working of the Stourbridge Gas Department for the twelve months ended March 31, Mr. Charles H. Webb (the Engineer and Manager) says the sales of gas by both ordinary and prepayment meters show decreases (of about 2,000,000 c.ft. under each heading), largely due to the working of the Summer Time Act last year. Public lighting was further reduced from 11,100,000 c.ft. to 1,400,000 c.ft. The gas manufactured was 15,362,000 c.ft. less than the previous year; and the gas unaccounted for was reduced by 1,344,300 c.ft.

On revenue account, the continued high price of coal and other materials has had its effect on the expenditure side. No advance in the price of gas has been made during the year; and income from this source is slightly less than last year, chiefly due to reduced public lighting. The increases in the price of gas at present in force, as compared with pre-war rates, are: Ordinary lighting and power, 4d. per 1000 c.ft. and prepayment supplies 1⅜d. per 1000 c.ft. Residuals show good returns, yielding 76·26 p.ct. on the cost of coal and oil, as compared with 58·58 p.ct. last year. The balance carried to profit and loss account is £14,685. After making the deductions for income-tax (which has increased from £1602 to £2750), and annual instalments and interest, the surplus is £5109. The alterations required to permit of oil-washing for benzol recovery are nearly completed; and this process will shortly be in operation.

From the working statement, it appears that the gas made amounted to 241,667,000 c.ft., of which 236,042,000 c.ft. was coal gas. The make of coal gas per ton carbonized was 12,833 c.ft., and the sale 11,622 c.ft. The percentage unaccounted for was 7·32.

COKE-OVEN GAS FOR LIGHTING.

An Absurd Sheffield Decision.

In the "Journal" for May 8 [p. 226] a comment appeared upon the ridiculous decision of a House of Commons Committee prohibiting the Sheffield Gas Company from distributing coke-oven gas for lighting purposes. In a reference to the matter last Friday the "Iron and Coal Trades Review" also sees the absurd side of the decision. It says: "The point seems to have attracted no general attention; but it is of no little importance at the present time. In Sheffield itself, even, the importance of the question does not seem to be fully realized; for although the City Council have deliberated upon it, nothing has been done, nor is any action contemplated apparently. As matters stand, therefore, if the steel and other trades of Sheffield are to have supplies of coke-oven gas, the streets of the city must be torn-up and the cost of laying separate mains incurred; whereas it would be comparatively simple and inexpensive to purify and conduct the gas through the existing pipes mixed with the ordinary town supply, which is the method already adopted, we believe, in Middlesbrough, Leeds, and Birmingham. No later than last winter, Sheffield was short of gas, and the manufacturers everywhere were crying out for it. The new control of the coal industry may, or may not, ensure better results during the coming winter; but it is surely folly to wantonly neglect so cheap and convenient a source of supply; and if separate mains are insisted upon, it seems probable that Sheffield will have no coke-oven gas at all. The same arguments, of course, apply to other centres; and it is to be hoped that they may be noted and inwardly digested by House of Commons Committees who are called upon to deal with such questions. Perhaps the Coal Controller will move in the matter. We understand that his attention has been called to it; and we should not be surprised if he took some action, for it certainly seems absurd that at a time when there is a coal shortage, and every nerve is being strained to relieve the pressure, both present and prospective, on the railways, thousands of tons of coal should be unnecessarily conveyed into Sheffield or any other town. Even where

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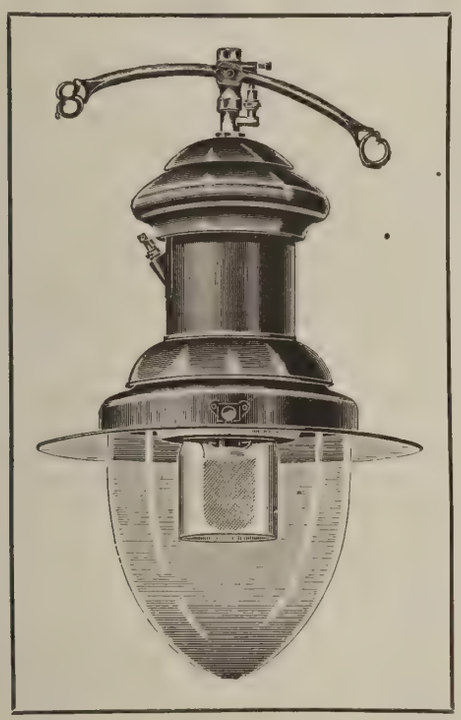

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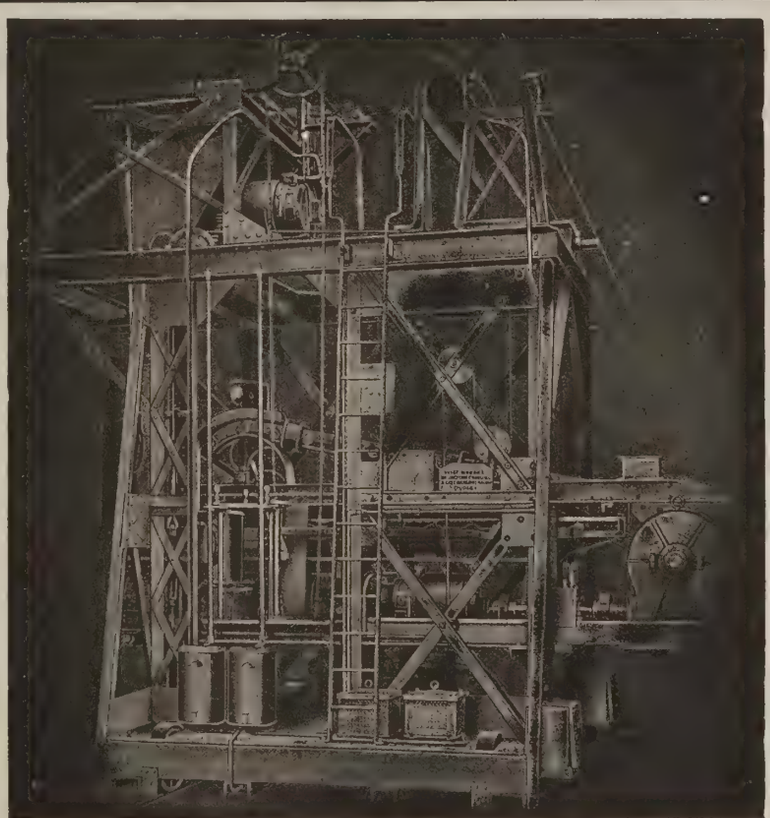

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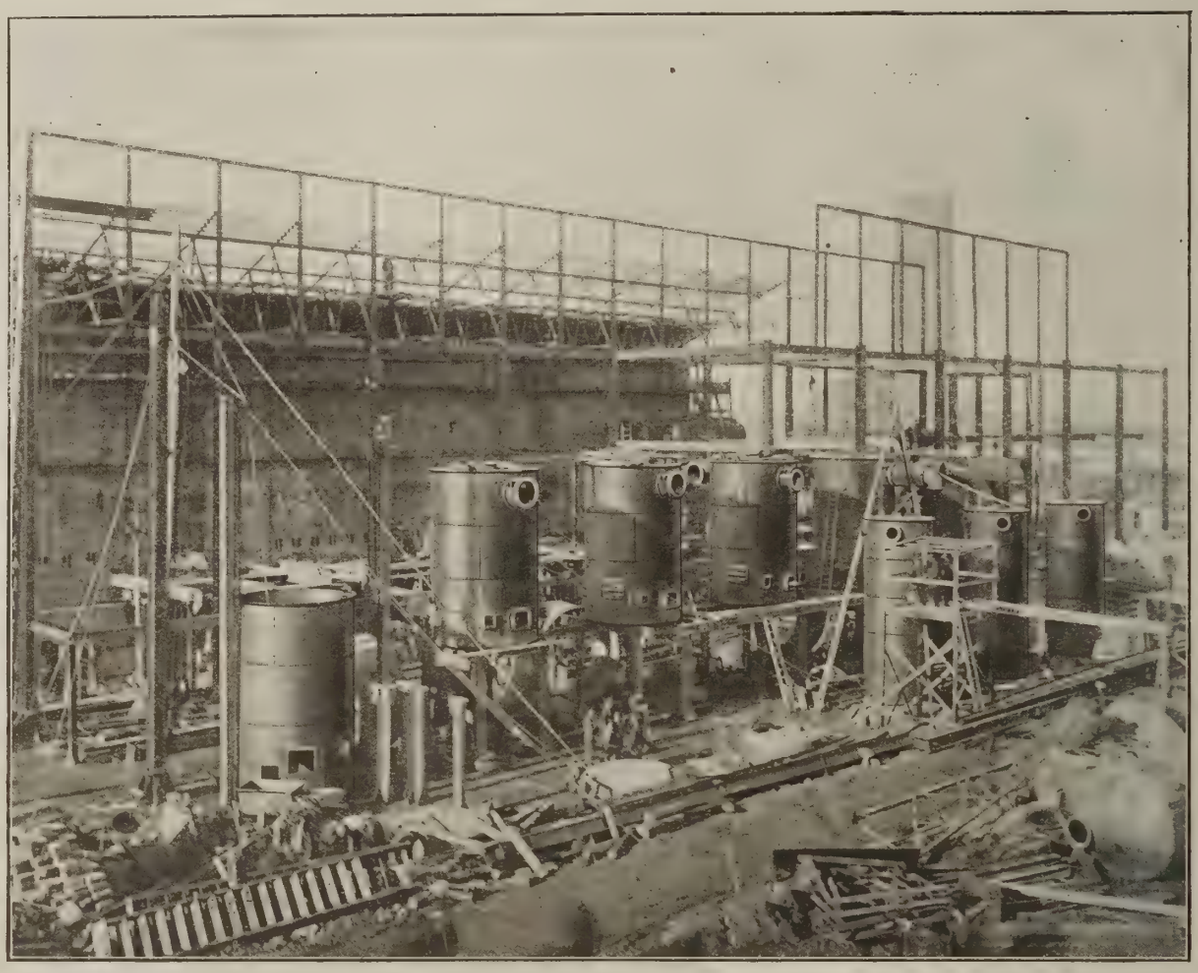

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CONTENTS.

EDITORIAL NOTES.

Steps to Financial Relief for Gas Undertakings . . . 137
Gas Composition and the Board of Fuel Research . . . 138
Hackney "Undue Preference" Case . . . 139
The Chemist and the Gas Industry . . . 139
Coalite Rumours and Speculation—Receding Low-Temperature Carbonization — Gas Heating and Next Winter—Figures from Manchester . . . 140
And Other Places—A Union of Manufacturers . . . 141

Coal Gas (not Water Gas) to be Made . . . 141
Quality and Pressure of Gas Supply . . . 141
Personal . . . 141
City and Guilds Examination Passes . . . 141
Electricity Supply Memoranda . . . 142
The Institution of Gas Engineers—After the Meeting. By Norton H. Humphrys . . . 143
Rational Utilization of Fuels . . . 144
A Novel Gas Bill Chart . . . 144
Society of Chemical Industry—
Presidental Address of Mr. Charles Carpenter, D.Sc. . . . 145
Some Observations on the Texture of Fire-Clay. By Walter C. Hancock, B.A. (Cantab.), F.I.C., and W. E. King, A.R.C.S. . . . 146
Industrial Fuel from Gas-Works. By E. W. Smith . . . 146
The Calorific Value of Industrial Gaseous Fuel. By W. J. Pickering . . . 148
Some Sources of Benzene and Toluene for High Explosives. By T. F. E. Rhead, M.Sc. . . . 148
Recent Developments in the Industrial Application of Town's Gas. By C. M. Walter . . . 149
Patents. By Dr. A. Ree . . . 150
Co-Operative Research. By H. W. Rowell . . . 150
Gas as a Labour-Saving Agent . . . 152
Production of Coke . . . 152
Apparatus for Reducing Volumes of Gases to Standard Temperature and Pressures. By A. V. C. Fenby . . . 153
Shut-Off Valves on Gas-Services . . . 154

CORRESPONDENCE

The Sliding-Scale Question . . . 155

REGISTER OF PATENTS.

Gas-Turbines. Kuhl, P. C. . . . 155
Charging Apparatus for Gas-Producers. Sahlin, A. . . . 155
Gas Lighting Torch. Keith, J. & G. . . . 155
Gas Ovens and Cookers. Thompson, H. . . . 155
Continuous Distillation of Tars.—Kilburn, B. E. D. (Sulzer Frères, Société Anonyme) . . . 155
Gas-Fired Furnaces—Davis, H. N., and Twigg, W. R. . . . 155
Heating Vertical Retorts—Strassmann, P. G. 156
Applications for Patents . . . 156

PARLIAMENTARY INTELLIGENCE.

"Jena" Glass . . . 156

LEGAL INTELLIGENCE.

Preferential Charges for Electricity—A Complaint by the Gas Light and Coke Company 157

MISCELLANEOUS NEWS.

European Gas Company, Limited . . . 160
Malta and Mediterranean Gas Company . . 161
Manchester Corporation Gas Undertaking . 162
Birkenhead Gas-Works Results . . . 163
Gas Progress in Dundee . . . 163
The Ashton Chemical Explosion . . . 164

MISCELLANEOUS NEWS (*continued*)—

Alloa Gas Department . . . 164
Wages Arbitration at the Bury Gas-Works . 164
Stourbridge Gas-Works Report . . . 164
Coke-Oven Gas for Lighting . . . 164
Utilization of Irish Peat . . . 165
Coal Transport Scheme . . . 165
Vehicles Propelled by Gas . . . 165
Current Sales of Gas Products . . . 166
Coal Trade Report . . . 166
Stock Market Report . . . 168

PARAGRAPHS.

The Gas Light and Coke Company's Dividend—Calorific Standard Orders . . . 141
Calorific Standard in Indiana—Chemical Industry of Japan . . . 143
Dividend of the Tottenham District Light, Heat, and Power Company . . . 144
Industrial Canteens—The British Thermal Unit . . . 152
Specification for Portland Cement . . . 154
Montrose Gaslight Company . . . 156
Warrington Wages Arbitration—Welsbach Light Company, Ltd.—"Coalite" Information Needed—Sedgley Gas-Works Employees . . . 159
Berwick Gas Company . . . 161
Quality of Brentford Gas . . . 163
Rothwell Gas Supply—Market Harborough Gas Undertaking—Oldham Gas Department Administration . . . 166
Sulphate of Ammonia Exports—Wages at Brighouse—Stirling Gas Light Company—Quality of Gas at Keighley—Coal Transport Re-Organization Scheme—Oswaldtwistle Gas Engineer Complimented—Aldershot Gas, &c., Company—Gas Progress in Connecticut . . . 167
Gas-Works Sold at Auction—Gratification at Selby—Newport (Mon.) Gas Company—Gas-Workers' Wages at Dundee . . . 168

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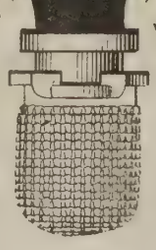

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UTILIZATION OF IRISH PEAT.

The Fuel Research Board, with the sanction of the Committee of the Privy Council for Scientific and Industrial Research, has appointed a Committee of Inquiry into the utilization of Irish peat deposits.

The terms of reference to the Committee are as follows: "To inquire into and to consider the experience already gained in Ireland in respect of the winning, preparation, and use of peat for fuel and for other purposes, and to suggest what means shall be taken to ascertain the conditions under which (in the most favourably situated localities) it can be profitably won, prepared, and used—having regard to the economic conditions of Ireland; and to report to the Fuel Research Board."

Though the inquiries of the Committee will (the official intimation states) ultimately lead up to the consideration of peat as a source of energy in central power stations, there are sound reasons why this aspect of the problem should be postponed to a later stage. On the one hand, the Fuel Research Board is already organizing an extensive inquiry into the problems of fuel economy in connection with power production; and the results of this inquiry will supply the fundamental data and information which will be required when the time comes for the consideration of any wide scheme of development in Ireland. On the other hand, any schemes of development must be based on a more exact knowledge than is at present available regarding the selection of the more favourably situated bogs, and the possibilities of winning and transporting partially dried peat to centres at which it may be converted into marketable products. It is obvious, therefore, that the inquiries of the Committee are likely to be most fruitful if they are concentrated on the fundamental problems; for until these are settled no satisfactory progress can be made.

COAL TRANSPORT SCHEME.

In an editorial article on "Coal Transport Considerations," the "Iron and Coal Trades Review" remarks: "Much interest and curiosity have been aroused by the Controller's statement that his scheme is estimated to save 700 million ton-miles annually. We have already pointed out that 700 million ton-miles at ½d. per ton-mile mean 1½ millions sterling. . . . It may be observed that such an economy would mean setting free in one year railway transport capable of carrying 7,000,000 tons 100 miles. This quantity, of course, is less than half the requirements of London alone, and represents about 20,000 10-ton wagons on the basis of three journeys a month. On the same basis, it may be estimated that the 600,000 or more private wagons on British railways, most of which are engaged in mineral traffic, alone run some 21,600,000,000 ton-miles annually, and they actually run a great deal more, of course, as their journeys are not limited to 100 miles, and they sometimes do more than three journeys a month. But enough has been said perhaps to indicate that 700 million ton-miles, even if they can be saved, form but a small percentage of the total ton mileage of the country. . . . It is important that all consumers should be supplied with suitable coal as far as possible. Any other policy defeats its own object, inasmuch as with the poorer sorts a larger quantity is necessary to achieve the same result." Even though 700 million ton-miles represent but a small percentage of the total ton mileage of the country, in these times such a saving cannot be belittled. Every saving means something worth having in the whole economy. Supplement it by the saving that could be effected by reducing the inert material or dross carried now (and sold as good coal) through bad picking at the mines; and the result is considerably strengthened.

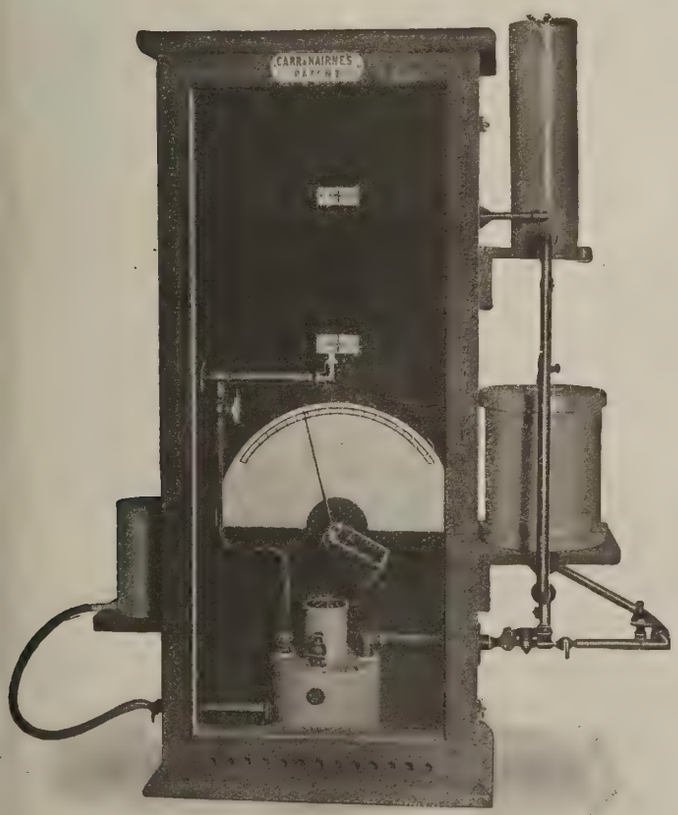
VEHICLES PROPELLED BY GAS.

The Manager of the Scottish Motor Traction Company, after a number of experiments, has succeeded in making use of coal gas as a substitute for petrol. The holder containing the gas is formed of specially prepared rubber, and takes a sufficient supply to propel the bus for a distance of fifteen miles. The Company's vehicles are now a feature of Edinburgh. They connect the city with outlying towns and villages, most of which are within the fifteen-mile limit. It is expected that the new arrangement will enable the Company to maintain their full time-table, and, by reducing running costs, render unnecessary any increase on pre-war fares.

The Southend Corporation Gas Committee have given consideration to an application from the local Char-a-Banc Company for permission to erect a meter-house in one of the shrubberies of the Marine Parade in connection with a proposal to adopt the use of coal gas for the running of motor chars-a-bancs. The Committee had visited the site, and interviewed the Directors of the Company and the Manager of the Southend Gas Company, and decided to recommend the Council to grant the permission asked for.

The transfer of the offices of the Department of Scientific and Industrial Research (including the Fuel Research Board) to No. 15, Great George Street, Westminster, S.W. 1, takes place to-day.

JET CALORIMETER.



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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 23.

It is reported that 42s. 6d. net per ton f.o.b. export ship at maker's works has been paid for pitch. The position of this product is strong; and manufacturers seem disposed to await the development of the situation. Creosote and the other products under official control are without alteration in price.

Sulphate of ammonia is still governed by the official prices in the interest of home agriculture; while the export is controlled mainly through an official Committee.

Tar Products in the Provinces.

July 23.

There is nothing fresh to report concerning the market for tar products.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of June, was 27s. 4d. per ton.

COAL TRADE REPORT.

Northern Coal Trade.

There is a good demand for the best classes of coal, but exports are rather limited. In the steam coal trade the demand is fair. The price of best Northumbrian steams is about 30s. per ton f.o.b.; second-class descriptions are in fair inquiry at from 25s. 6d.; steam smalls are 18s. 6d. to 20s. 6d. Work is well maintained at the collieries; but the scarcity of steamers occasionally makes a pit idle a day or so. In the gas coal trade the demand seems to be increasing. "Wear Specials" are firm at from 28s. to 30s. per ton f.o.b.; best Durhams are steady at 25s.; and second-class gas coals are about 23s. 6d. per ton. There is not much doing in the new contracts; but this inactivity is not surprising when the Controller's stipulation is borne in mind, that they do not "come into operation" till Sept. 10. Other buyers may wait a little, though there is the possibility of freights in the autumn being higher. Gas coal from the Tyne to London is quoted about 15s. freight; but the rates vary with the scarcity or otherwise of steamers for that branch of the trade. Good gas coke is from 30s. 6d. to 32s. per ton f.o.b., according to the place of shipment. Freights on coke are based on about 45s. from the Tyne to the Northern ports of France.

Rothwell Gas Supply.—The annual report and balance-sheet of the Rothwell gas undertaking for the year ended March 31 has been issued. It shows that the gross profit was £704; and the sum of £950 is required for loan repayment and interest. There is a net loss of £246 on the year's working.

Market Harborough Gas Undertaking.—The Market Harborough gas undertaking has had a fairly successful year. The accounts just published show that the total receipts amounted to £12,080, while the expenditure came to £10,339. The amount of the loan originally borrowed was £54,000. On this, the sum of £977 had been paid as interest during the year. The amount paid as principal was £1254; and the balance owing at March 31 was £45,180.

Oldham Gas Department Administration.—In a letter appearing in the "Oldham Chronicle" attention is drawn to the resignation of Mr. Arthur Andrew, owing to ill-health, from the position of General Manager of the Gas and Water Departments of the Corporation, whose service he entered as office boy on June 4, 1866—thus having completed 51 years with the departments. It is, says the writer, a matter of great pain to him to think that a gentleman who has done so much for Oldham as Mr. Andrew has should be treated with such scant consideration; and he urges that Mr. Andrew's long record of underpaid service should have induced the Town Council at least to appoint him Consultant, though an unconditional retiring allowance would be no more than his due. The writer continues: "In view of the re-arrangements of staff caused by his retirement, I know that any such allowance would be repaid ten times over by the shrewd advice and sound experience which would thus be available. I would mention that pensions, retiring allowances, or appointments as consultants for officials and workmen of long service are customary with companies—why not with corporations? Corporation service is quite as arduous, and is generally worse paid, than in the case of companies. . . . . I would ask each member of the Town Council to reconsider Mr. Andrew's case, not with a view to generosity, but with a view to the justice for which I plead. Anything less would be unworthy of the town and of its municipal representatives."

Sulphate of Ammonia Exports.—The June exports of sulphate of ammonia are returned at 1645 tons, the f.o.b. value being £33,951, equivalent to, approximately, £20 12s. 6d. per ton. For the completed half year the shipments aggregate 36,511 tons, compared with 127,880 tons in 1916, and 159,976 tons in 1915.

Wages at Brighouse.—The Brighouse Corporation General Purposes Committee, after considering an application by the Workers' Union for an increase of wages equal to 12s. per week over pre-war rates, recommend the Council to adopt a principle of 10s. advance over pre-war rates to the employees, with exceptions such as the respective committees may deem advisable; that such advances be retrospective to July 1; and that, failing acceptance of these terms, the matter be referred to arbitration.

Stirling Gas Light Company.—A statement of the position of the Stirling Gas Light Company shows that the balance at the credit of profit and loss, after payment of interest, income-tax, and dividend on the preference shares, is £5153. A dividend is paid, on each share of £5 7s. 6d., of 87·194d.; and on the new £10 shares, at the rate of 10s. per share. A sum of £1640 is carried forward. For the year ended May 15, the gas manufactured was 130,246,552 c.ft., yielding £22,050, The revenue account shows for residuals, £6525; rental of meters, £740; and rent of stoves, £322. Notwithstanding the increase of wages and materials, the Company had written-off £2000 from the account of value of superseded gasholders.

Quality of Gas at Keighley.—A statement was made at the monthly meeting of the Keighley Town Council that complaints were general as to the bad heating and lighting quality of the gas supplied. It was pointed out in reply that the treatment of the gas to meet war conditions made some slight difference in heating and candle power; and the need for the proper adjustment of burners was emphasized. So far as heating was concerned, the depreciation was said to amount to no more than 6 p.ct. In regard to lighting, it meant a reduction of about 2 c.p. in the case of flat-flame burners; but with incandescent burners, the illuminating power was hardly affected at all.

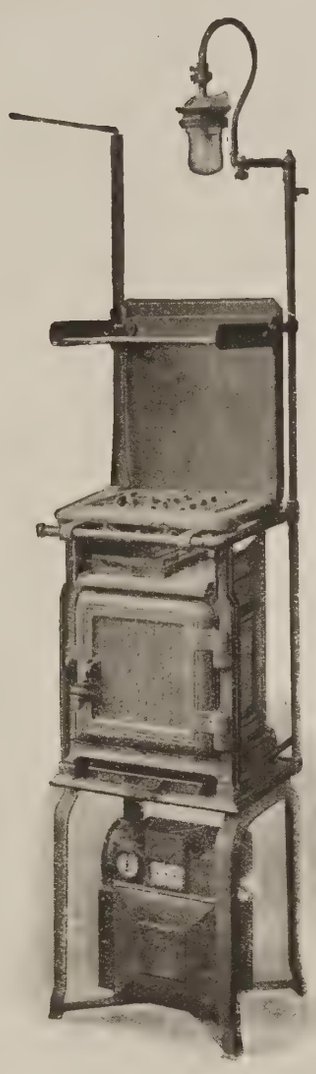
Coal Transport Re-Organization Scheme.—In connection with this scheme, the Controller of Coal Mines is considering the requirements of steam-raisers in regard to supplies of special coal fuel. Forms have been sent out to steam-raisers throughout the country, asking for information in regard to the class of coal used, consumption, &c. A considerable number of the forms sent out have not been returned; and steam-raisers who have received such forms are asked to note that their requirements in the way of special fuels cannot be considered in the absence of the information called for by the forms, which should be filled in immediately and dispatched to the Controller of Coal Mines. In cases where steam-raisers have not received forms, they should apply at once to the Controller of Coal Mines, at No. 8, Richmond Terrace, Whitehall, London, S.W. 1.

Oswaldtwistle Gas Engineer Complimented.—Mr. T. C. Usher (the Chairman of the Gas Committee), at last Thursday's meeting of the Oswaldtwistle Town Council, presented a report dealing with the working of the gas department for the last financial year. He said the cost of coal carbonized amounted to £6379, an increase over the previous year of £880. The total revenue from gas was £10,334, and from residuals £4569—making, with miscellaneous revenue, a gross income of £15,578. The expenditure amounted to £11,931, leaving a gross profit of £3646, as against £2662, which, after payment of interest on loans and sinking fund charges, left a net profit of £1004, as compared with £161 the previous year. The report was unanimously approved. Mr. A. Hargreaves, J.P., observed that great credit was due to their Engineer (Mr. J. H. Davies), whose work in the gas undertaking since his appointment ten years ago had been performed with credit to himself and to the best possible advantage of the ratepayers.

Aldershot Gas, &c., Company.—The accounts of the Aldershot Gas, Water, and District Lighting Company for the half year ended June 30 show a surplus of £10,882; and the Directors recommend the payment of full statutory dividends. In spite of the Summer Time Act, the increase in the sales of gas (exclusive of works and special contract) was nearly 10¼ p.ct. The electricity department also continues to extend; the increase in sales for the half year being nearly 153¾ p.ct. The Directors record, with great regret, the death of Mr. A. F. Wilson, on April 12. Mr. Wilson had been long associated with the Company—in its early days as Lessee, and since 1881 as Director. For 28 years, to 1910, he presided as Chairman. Then, owing to advancing age, he decided to stand aside, but continued as Director until his death. It has been unanimously decided to invite Mr. R. W. Edwards (the General Manager) to fill the vacancy created by the death of Mr. Wilson; and, at Mr. Edwards's request, the election has been deferred till an appropriate date, subsequent to the meeting, when he will be offered the position of Managing-Director. Mr. Edwards has been with the Company, as Chief Officer, for nearly nineteen years; and it is felt his valuable work is well known to the stockholders.

Gas Progress in Connecticut.—Some American State Commission reports for 1916, recently issued, indicate robust progress. The annual record of the Connecticut Public Utilities Commission sets forth that during the year the total investment in gas securities advanced from about $14,750,000 to $15,750,000. The receipts for sale of gas went up 10 p.ct., those for residuals 25 p.ct., and other miscellaneous sources of income, which probably include sales of appliances, no less than 200 p.ct. Against this, there is an increase in manufacturing expenses of 12 p.ct., for public street lighting 100 p.ct., taxes 20 p.ct., and depreciation 33 p.ct.; but the net revenue has advanced nearly 10 p.ct. The gross income was $4,138,531—an increase of 14 p.ct.; but as it does not greatly exceed one-fourth of the capital investment, the undertakings are rather heavily capitalized. In addition, fifteen companies supply both gas and electricity—coal, water, and mixed gas being used, with one exception in favour of acetylene. The investment on gas is kept separate, and amounts to about $5,000,000; and the total income on the gas section was $1,082,686. The expenditure was $827,399, leaving a net revenue of $255,287. While the income has increased 23 p.ct., there is only a small addition to the net profit, due to expanded manufacturing expenses, more gas purchased in bulk, and largely advanced taxes and depreciation.

Slot Installations



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Gas-Works Sold at Auction.—Last Thursday, Mr. A. W. Cock offered for sale by auction, as a going concern, the works and rights of the Appledore Gas Company, Ltd., North Devon. The Company supply the Appledore district with gas; and included in the property were 200 meters, 70 public lamps, and the working plant of the concern, which was established in 1874. Bidding started at £800; and the property was purchased by Mr. R. H. Groves (the Chairman of the Blandford Gas Company) for £1350.

Gratification at Selby.—It was unanimously agreed at a meeting of the Selby Urban District Council that the Clerk be instructed to write a letter to Mr. T. H. Alderson (the Gas Engineer and Manager) expressing the gratification of the Council at the satisfactory report on the past year's operations at the gas-works. The report showed that the output of gas in the twelve months ended March 31 was practically the same as in the preceding year; the make per ton of coal carbonized being 11,537 c.ft., as compared with 11,523 c.ft. for the year before. The unaccounted-for gas amounted to 5·4 p.ct. The result of the operations is a gross profit of £1972, and a net profit of £1234; the £738 paid for instalments and interest on loans and placed to sinking funds being equal to 3·81d. per 1000 c.ft. of gas sold. There was an increase in the amount received for gas of £171, due to an addition of 4d. per 1000 c.ft. to the price, which came into force on Oct. 1, 1915.

Newport (Mon.) Gas Company.—In the report which will be sul mitted to the proprietors next week, the Directors recommend pa ment of the statutory dividend. They regret having received the r signation of the Deputy-Chairman (Mr. T. G. Cartwright) owing t his removal from the district, and place on record their high appreci tion of his 24 years' devoted service. Mr. George Geen has been a pointed Deputy-Chairman; and Sir A. Garrod Thomas, M.P., has bee elected to fill the vacancy on the Board.

Gas-Workers' Wages at Dundee.—The Dundee Gas Committe have decided to refer to arbitration the question of whether or not th labourers in the Gas Department should participate in the rece award made to other sections of the engineering industry. Mr. Ale Yuill (the Gas Manager) stated that at the last meeting of the Con mittee it was practically arranged that the labourers at the gas-wor should be brought into line in respect of wages with those in th Works Department. It was agreed to give them an increase whic brought up their wages to 10s. 7d. over the pre-war wages; and th application they now made was that they should get 12s. advance ov the pre-war rate. It was agreed that the advance voted by the Tow Council a month ago should be paid as from then; and that th further advance of 1s. 5d. should be made retrospective, if sanctione by the Arbitrator.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange seems almost to have settled down into a groove—week after week—in succession exhibiting a monotonous sameness. Having regard to the general firmness of most of the leading departments, this is not an unwelcome feature; but it does not contribute to the formation of interesting history. The most desirable factor—*i.e.*, an increase in the volume of business—seems still to be far off as ever, and the unconquerable inactivity detracts from the measure of cheerfulness which markets enjoy, and have for some time past been enjoying. Last week, indeed, the tone daily became brighter and brighter until Friday, when the intelligence of a recrudescence of unrest in Russia. This precipitated a reaction which is not unusual after a too liberal rise in prices.

The gilt-edged market, however, came out well on balance, notwithstanding the check. Home Government issues were in good demand. War Loan and Consols showed great strength, and Indian and Colonial issues were firm. Home rails did fairly well, especially prior charges. The American Market came in for little attention, and drooped from inanition; but Argentines were in good demand, founded on hopeful expectation of better rates.

The Foreign Market was less prominent than the week before. Of course, everything Russian had a set-back; but there was no weakness elsewhere, save when there was a little profit-snatching after the Brazilian advances. French loan improved, and Chinese was stimulated by Republican successes. There was some inquiry for Greek. South Africans were dullish. Among the rest, Rubber was firm; but Oils were rather irregular. Iron and Steel concerns were among the popular ones.

Business in the Gas Market quite failed to maintain the burst of activity which it displayed the preceding week, and fell back into its former provoking state of listlessness. Only some half-a-score of undertakings were touched at all, and most of these were only nibbled at. Prices of bargains marked showed hardly any change from the week before, and there was only one variation in quotation, which was for the better. The Gas Light and Coke Company Board recommend the payment of the full statutory rates of dividend. The Money Market was easier, but discount rates ruled firm.

Bargains done for cash during the week were as follows: On Monday, British 33¼, ditto debentures 66, 66⅜, Gas Light ordinary 71⅜, 72, 72¼, ditto preference 73½, Imperial Continental 79½, 80, Primitiva 38s., 39s. 3d., ditto preference 56s. 6d., South Metropolitan 74, 74½, Tottenham "A" 90. On Tuesday, Brentford "B" 78, British, 33, 33½, Commercial debenture 52, European 12, Gas Light ordinary 71¾, Imperial Continental 79½, 80, ditto debenture 63, Sheffield "B" 180, South Metropolitan 74, 74½. On Wednesday, British 33, Continental Union 39½, ditto preference 60½, Commercial debenture 52½, European 12 3/16, 12¼, Gas Light ordinary 71½, 71¾, 72¼, South Metropolitan 74½. On Thursday, Continental Union 39½, 40, Imperial Continental 79½, 80, 80⅛, South Metropolitan 75. On Friday, European 12¼, 12½, Gas Light Ordinary, 71⅛, 71¾, 72⅛, 72¼, Primitiva preference, 57s. 6d., South Metropolitan 75.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When paid Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	,,	April 8	2⅝	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62*	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5¼	..
50,000	10	Feb. 26	16	15/-	Bourne-mouth Gas and Water: 10 p.c.	29—30	24—26	..
383,110	10	,,	7	7/-	Bourne-mouth Gas and Water: B 7 p.c.	15—15½	10⅜—11½	..
115,000	10	,,	6	6/-	Bourne-mouth Gas and Water: Pref. 6 p.c.	13½—14	9¼—9⅝	..
159,740	—	—	—	4%	Bourne-mouth Gas and Water: 4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5 7/10%	Brentford A Consolid.	261—266	79—82*	..
734,920	,,	,,	11	4⅛%	Do. B New	204—209	77—80*	78
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86*	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33—33½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	66—66⅔
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	2½—3	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	..
560,000	,,	,,	5⅓	46/8	Do. 3½ p.c. do.	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	52—52½
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½—40
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	60—62	60½
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½—18	11½—12½	12—12½
16,313,430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke: 4 p.c. Ord.	98—102	71—73	71½—72½
2,600,000	,,	,,	3½	3½%	Gas Light and Coke: 3½ p.c. max.	76—79	56—58	..
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	72—74	73½
4,674,850	,,	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	55—57	..
130,000	,,	,,	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅞%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5¾%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	79½—80½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	63
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	82—83	..
					Liverpool 5 p.c. Ord. B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅞—4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅝—99½	70⅛—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	71—73	..
55,940	10	Feb. 26	7/14/0	7 7/10	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	92—97	..
100,000	50	,,	12	11%	Do. C	118—121	85—90	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅞—2⅛	39/0—39/3
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	2⅜—3⅛	56/6—57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½—11	7⅜—8⅛	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Sheffield B	222—224	178—182	180
523,500	,,	,,	10	10%	Sheffield C	220—222		
90,000	10	May 28	9	6/-	South African.	10½—11½	8⅜—9⅛	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	74—75
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57*	..
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135,000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham District: A 5 p.c.	135—138	95—100	90
782,275	,,	,,	6	3½%	Tottenham District: B 3½ p.c.	115—117	68—73	..
181,255	,,	June 26	4	4%	Tottenham District: 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c.	151—156	114—119	..
255,636	,,	,,	6⅞	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	,,	,,	5/17/8	56/-	Do. C 3½ p.c.	110—115	86—91	..
352,000	,,	,,	6⅛	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6⅝	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

The price of gas at North Berwick has been increased from 5s. to 5s. 7½d. per 1000 c.ft.

The Jedburgh Gas Company have paid a dividend of 6s. per £6 share, free of income-tax. A sum of £50 is placed to depreciation account; and a balance of £112 is carried forward.

The Selkirk Gas Company are paying a dividend of 5 p.ct., and placing to depreciation account £450. The present price of gas—3s. 11½d. per 1000 c.ft.—is maintained. For the year to April 30, the total make of gas was 34,081,500 c.ft.—a decrease of 7,993,900 c.ft. as compared with the previous year.

Charlotte Thompson, of Golcar, who lived alone, committed suicide by fastening a piece of rubber piping to a bracket and inhaling gas. The window and chimney of the room in which she was found were blocked-up. It was stated at the inquest that deceased had suffered from illness and great depression.

A verdict of "Accidental death" was returned at Bexhill, in the case of a woman, 67 years of age, who was found dead in her bath. There was a geyser in the room, the tap of which was turned fully on, but the gas was not lighted. The doctor said he thought deceased had first been overcome by the gas, and then drowned. The windows were tightly shut; and there were practically no means of getting fresh air into the room.

The current issue of the "Croydon Co-Partner" contains as a supplement the rules of the Croydon Gas Company's co-partners' pension fund, which came into operation on April 1 last. Members joining up to the age of thirty contribute a sum equal to 3 p.ct. of their salary or wages for the time being; those upwards of thirty years, 4 p.ct. Special provision is made for co-partners who were at the starting of the fund over fifty years of age. No pension is to be paid for a period of ten years from the commencement of the fund.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Engineer and Manager. Stratford-on-Avon Corporation. Applications by July 31.

Engineer and Manager. Seaford Gas Company. Applications by Aug. 8.

Gas Manager. Scunthorpe Urban District Council. Applications by Aug. 9.

Manager. No. 6328.

Assistant Engineer and Manager. No. 6329. Applications by July 30.

Appointments, &c., Continued.

Assistant Manager. Peterborough Gas Company.

Working Manager. Eye Gas-Works.

Working Foreman. Stoke-on-Trent Gas-Works.

Gas Fitter. Frome Gas-Works.

Stoker. Yorktown Gas-Works.

Appointments, &c., Continued.

Skilled Labourer. Chiltern Hills Spring Water Company.

Meeting.

Tottenham District Light, Heat, and Power Company. No. 639, High Road, Tottenham, Aug. 18. Three o'clock.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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In payment of subscriptions for "Journals" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to Walter King, 11, Bolt Court, Fleet Street, London, E.C. 4

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

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LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
Palmerston House,
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"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
Andrew Stephenson, Gresham House, Old Broad Street, London, E.C. "Volcanism, London."

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SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, May 15, p. 268.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
Repairs receive prompt attention.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
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SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
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GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

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CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
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And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

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In Bulk for Works Use.
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BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

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A BRITISH Oxide Cheaper and Better than Bogore. 35 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan.
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ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

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FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.

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DONNINGTON, NEWPORT, SALOP.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

WANTED—A Manager for 6 Million Works. Good Wages to Capable Man.
Apply, giving full Particulars as to Qualifications, Age, if Married, number in Family, &c., to No. 6328, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED—A Gas-Fitter Experienced in Fixing and Maintenance of Cookers, Gas Fires, and Incandescent Burners; also able to Lay Mains and Services if required.
Apply, with References, Stating Age and Wages required, to the MANAGER, Gas-Works, FROME.

STOKER Wanted—Used to Shovel Charging. Wages, 7s. per Twelve-Hour Shift. Holiday, with pay. 9s. paid for Sunday Shifts. Permanency for suitable man.
Apply to MANAGER, Gas-Works, Yorktown, SURREY.

WANTED, immediately, a WORKING MANAGER for a Small Country Works (about 3 Millions). Exhauster. Knowledge of Fitting. Cottage, Coal, and Gas.
Apply to the SECRETARY, Gas Company, Eye, SUFFOLK.

ASSISTANT Engineer and Manager Wanted for Gas-Works. Annual make over 1000 Millions.
Applications, stating Age, Experience, Qualifications, and Salary expected, enclosing *copies* of Three recent Testimonials, to be made in the first instance to No. 6329, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4, not later than the morning of Monday, the 30th inst.

PETERBOROUGH GAS COMPANY.

ASSISTANT MANAGER Wanted— Must be thoroughly Experienced in Retort House Work and Electrical Plant.
Apply, giving Age, Experience, and References, to
JOHN BARTON,
Manager and Secretary.
Gas-Works, Peterborough,
July 13, 1917.

SCUNTHORPE URBAN DISTRICT COUNCIL.

APPOINTMENT OF GAS MANAGER.

THE above Council invite Applications for the Position of WORKING GAS MANAGER.
Salary, £200 per Annum, with House, Rates, Water, and an agreed quantity of Coals and Gas free.
Applications, in candidates' own handwriting, with *copies* of Two recent Testimonials, to be sent to the undersigned not later than Thursday, the 9th of August, 1917, marked "Gas Manager."
By order,
G. E. DAVY,
Clerk to the Council.
110, High Street,
Scunthorpe, Lincolnshire.

STRATFORD-UPON-AVON CORPORATION.
(GAS DEPARTMENT.)

APPOINTMENT OF ENGINEER AND MANAGER.

THE Council invite Applications for the Position of ENGINEER and MANAGER of the Gas-Works. Candidates must be thoroughly Experienced in Modern Carbonizing Methods, Sulphate of Ammonia and Dehydrating Tar Plants, and Capable of Designing and Carrying Out Extensions of Works and Mains when necessary.
Salary, £250 per Annum, with Residence, Coal, and Gas provided at the Gas-Works.
Application, in writing, stating Age, Qualifications, whether Married or Single, together with *copies* of Three recent Testimonials, must be addressed to me not later than July 31, 1917.
Canvassing in any form will disqualify the Applicant.
ROBERT LUNN,
Town Clerk.
July 10, 1917.

CHILTERN HILLS SPRING WATER COMPANY, AYLESBURY.

WANTED—Skilled Labourer for Repairing Mains in Tring District, and to assist in Repairs to Deep Well Pumps, Cleaning out Boilers and Reservoirs; also Work General to Pumping Station. Wages, £1 7s. 6d. per Week, House, Garden, and Coal provided at Dancer's End Station.
Applicants must state Age and Qualifications.
H. A. CALLON,
Manager.

WANTED, by the Borough of Stoke-on-Trent, a WORKING FOREMAN for their Stoke Works. Must be a Good Carbonizer and have General Experience of Gas-Works Plant. Wages, 55s. per Week.
Apply, stating Age and Experience, with recent Testimonials, to the undersigned.
A. MACKAY,
Chief Engineer and General Manager.
Gas-Works, Longton,
Stoke-on-Trent.

SEAFORD GAS COMPANY.

THE Directors invite Applications for the Position of ENGINEER and MANAGER.
Salary, £250 per Annum.
Candidates must be thoroughly experienced in Carbonization, Making Carburetted Water Gas, Sulphate of Ammonia, Dehydrating Tar, and Designing and Carrying Out Extensions to Works.
Applications, stating Age, Experience, and enclosing *copies* of Three recent Testimonials, to be addressed to the CHAIRMAN, at the Gas-Works, SEAFORD, Sussex, on or before Aug. 8.

GASHOLDERS and Other Plant Wanted, either for Re-use or Scrapping. Dismantling Specialists.
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GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
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TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 639, High Road, Tottenham, on Saturday, the 18th day of August next, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ending the 30th of June, 1917; to declare Dividends; to elect two Directors and an Auditor for the ensuing year; and to transact General Business.
The TRANSFER BOOKS for the Consolidated "A" and "B" Stocks and the Preference Stock WILL BE CLOSED from Saturday, Aug. 4, to Saturday, Aug. 18, both days inclusive.
By order of the Board,
E. J. K. FUSSELL,
Secretary.
Chief Offices of the Company,
639, High Road, Tottenham,
July 19, 1917.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C.

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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in price.
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See our large Advertisement appearing in alternate issues of the "JOURNAL."
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COKE OVEN AND BYE-PRODUCT CO.,
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CONTENTS.

EDITORIAL NOTES.

The Appeal for Maximum Coal-Gas Output . 183
The Hackney Judgment 183
Determining the Gas Production Goal. . . 185
The Gas Light Company's Meeting and the Dividend—Coal Topics—Six Months' Coal and Coke Exports—The Union of Manufacturers—And the Federation of British Industries 186

Personal 187
German Association of Gas and Water Engineers 188
Electricity Supply Memoranda 188
Holidays: An Addendum. By A. C. W. . . 190
Sixty Years Ago 190
Longwood Gas Company's New Works . . 190
Dempster-Toogood Continuous Vertical System. 192
Fuel Economy. By E. W. Smith 195
Yorkshire Junior Gas Association 196
Volatile Products of Coal Carbonization . . 197
Carbonization of Dust and Soot. 197

CORRESPONDENCE

The Construction of Gas-Furnaces. . . . 197

LEGAL INTELLIGENCE.

Preferential Charges for Electricity—Judgment in the Hackney Case 198
Wilts County Gas Company, Ltd. 199
Koppers Coke-Oven Patents. 200
Alleged Passing-Off of Incandescent Mantles 200

PARLIAMENTARY INTELLIGENCE.

Progress of Bills; Sulphate of Ammonia . . 200

MISCELLANEOUS NEWS.

Edinburgh and Leith Gas Accounts . . . 200
Annual Report at Buxton 201
Smethwick Gas Accounts. 201
The Dukinfield Gasholder Fatality. . . . 201
Welsbach Light Company, Ltd. 202
Oswaldtwistle Gas Undertaking 203
Retort-House Work at Granton 204
Wages Question at Manchester 204
Edinburgh Gas-Workers' Arbitration . . . 205
Mansfield Gas Profits 205
Study of Gas Engineering and Manufacture . 206
Gas-Works and Allotment Gardening in America 206
Current Sales of Gas Products 207
Coal Trade Report 207
Stock Market Report 209

PARAGRAPHS.

Japanese Trade in Sulphate of Ammonia—Principles of Industrial Administration—South Metropolitan Gas Company's Dividend—Conserving Fruit and Vegetables—Calorific Standard Applications and Orders—Natural Gas in Kansas 187
Drying and Smoking Meat by Gas—"The Trade of To-morrow"—Illuminating Engineering Society of America 195
Examinations in Gas-Fitting—Littleborough Gas Company—Darwen Gas-Workers' Wages—Brisk Demand for Gas-Cookers at Oldham 197
Gas Complaints at Shipley—Salaries of Manchester Gas Officials 207
Coal Distribution Scheme—Wages Award at Plymouth Gas-Works—Darwen Gas and Electricity Departments Contrasted—Tideswell Gas Company—Plumbers' Holidays with Pay at Bury—The Alleged Gas-Works Nuisance at York—Exhauster Governors at the Tottenham Gas-Works—Chelmsford Gas-Works Transfer 208
Birkenhead and Meter-Rents—Wages at Burton-on-Trent—Wages Arbitration at Todmorden—Losses at Accrington . . . 209
Gas-Fired Soft-Metal Furnaces—A Leaving Certificate Refused—Composition and Quality of Gas—Moving a Testing-Station—Ossett Corporation Gas Charges . . . 210

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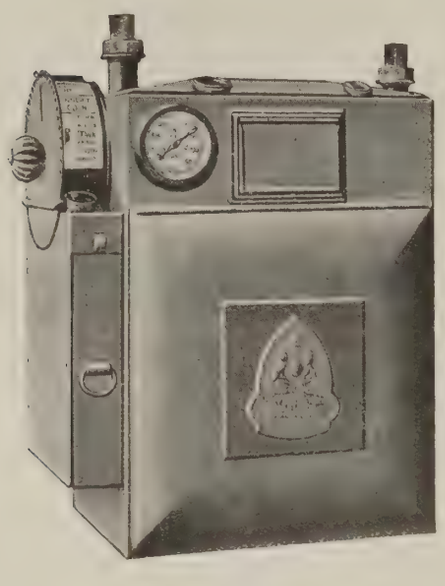

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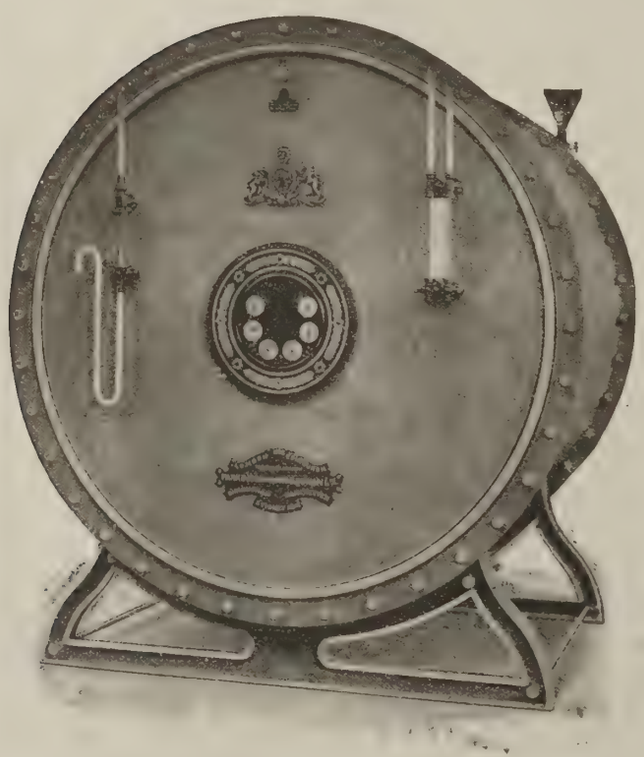

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EDITORIAL NOTES.

The Appeal for Maximum Coal-Gas Output.

IN this extraordinarily phased war, transitions of situation come rapidly, and decisions have to be varied accordingly, and that expeditiously. Not long ago, at the desire of the Coal Controller, we were urging gas undertakings, in order to economize coal, to mix a percentage of blue water gas or lightly carburetted water gas with respectably composed coal gas; and in this proposal, taken in conjunction with the conditions that are hovering over the industry and will assuredly settle upon it, there was seen future potentiality, to take advantage of which the present is a particularly opportune time. But already there is a diametrically opposing change. We now see the Coal Controller in active collusion with the Ministry of Munitions in appealing to gas undertakings to use their coal-carbonizing plants to the utmost extent and water-gas plants only to the measure necessary to meet surplus demands beyond the capacity of the coal-gas plant, or sudden flights in consumption which can be most promptly satisfied by the water-gas generators. Moreover, the Coal Controller [as the announcement published in the "JOURNAL" last week informed readers] is giving instructions for all necessary coal to be delivered to gas-works for carbonizing purposes, in order to help to relieve the newly-developed situation. The assurance can be given that nothing but the gravest circumstances would have induced this change of procedure—which, we believe, it may be said, is not due to any deficiency in the flow of the supply of materials for high explosives, but to another cause, which necessitates the maximum provision at home of "coal tar products." The richer the oil-producing character of the tar the better.

The new appeal to gas undertakings states that "certain "factors" have arisen which require a "reversal" of the policy which the Coal Controller, under the advice of Mr. Thomas Glover, had set afoot for producing economy both in gas manufacture and in coal consumption. We rather look upon the present appeal not as a "reversal," but merely as a suspension, of this policy; seeing that, if the "certain factors" are reversed or wiped-out, we shall have a re-establishment of the conditions that existed before these factors intervened, which would enable gas undertakings to return to the making and supply of a constant mixed gas. Although the necessitating circumstances are regrettable, it is, as a relief from an amount of anxiety in regard to coal supply, an excellent thing for responsible gas administrators and officials to know that the Coal Controller is going to give instructions for the requisite coal to be delivered to gas-works. But, in face of the change of appeal, it must be said that, when we come to reflect on the attenuated returns some gas undertakings are getting for the products required by the Ministry of Munitions and the poor controlled price for sulphate of ammonia, considering the cost of coal, materials generally, and labour—in short, the much higher level of all outgoings—with in many cases (under the sliding-scale) the present gloomy representation of a return upon capital, patriotism is being much strained, and Governmental reciprocity is something with which the gas industry would much like to make a more intimate acquaintance. Now what does this new appeal mean to gas undertakings? Many managements have been budgeting on some relief from dear coal by the utilization of a percentage of blue water gas; and, notwithstanding, the overall circumstances are such that in not a few instances charges for gas have had to ascend again, and dividends to descend still more. The appeal that coal-gas plant should be used to its utmost extent means that gas undertakings will be deprived of the anticipated economy of blue water gas, small as in cases it may be. It is all very well to say that the proposal is simply a reversion to the *status quo*. But every day the war burdens weigh heavier; and they, at all events, show no inclination to revert to the *status quo ante bellum*, or *ante* anything else. Search where the gas industry will, no compensations are found. It will, of course, comply with the new appeal. Patriotism is with it to-day a primary duty. But is it not time the Government did something to adequately compensate the industry, by redressing some of its grievances in relation first to the unfair return now being received on its capital through legislation which has had all the conditions upon which it was founded annihilated by the war, and by just payments to all undertakings, be they large or small, for the products that are being produced for war and fertilizing purposes?

There is, however, one suggestion that can be offered to the Coal Controller in connection with this new appeal. Naturally it means that a larger quantity of coal will have to be supplied to gas-works; and this larger quantity may, to a not inconsiderable extent, alter some of the plans made already by the Coal Controller. There are gas-works with an excellent margin of coal-gas producing plant; there are others that cannot boast a margin at all, without the use of their water-gas plant. Now the Coal Controller might consider whether he cannot secure a counterbalance to the increased supply to gas-works by, under his new household coal-rationing scheme, reducing the allowance per house where gas-cookers and gas-fires are installed, so ensuring their use instead of coal. In this way, he would be doing something that would help gas-works with good provision of coal-carbonizing plant to put more of it into profitable use, and at the same time they would secure some economy from their manufacture of blue-water gas. While making this suggestion, we are well aware that many authorities regard the published provisional plan as to domestic coal rationing according to the number of rooms in a house as complicated and unworkable. But if an attempt is going to be made from October next to work the scheme, there is no reason why a little more complication should not be introduced in the good causes of providing urgently needed "coal tar products," and of reducing the carriage of the "rations" by rail to the coal merchants, and the subsequent carting and labour involved in their local distribution, which will be an immense difficulty all next winter. It is easy enough for anyone to see that distribution of gaseous fuel by subterranean means is an economical procedure in these as at all times compared with road cartage and manual handling; and so this is a case where an additional complication in the terms of the rationing would produce some compensation in the directions indicated.

The Hackney Judgment.

THE first meeting of the Gas Light and Coke Company with the Hackney Borough Council over the question of "undue "preference" to electric power consumers in the matter of the charge for lighting, has resulted in Mr. Justice Astbury giving a decision in favour of Hackney. The judgment was delivered on Wednesday morning last; but apparently our electrical contemporaries were so astonished over the verdict that those issued on Friday were (with one small exception) unable to collect themselves for a comment upon the

event, together with a pæan of triumph. Perhaps they are going to reserve themselves for the decision in the Court of Appeal; for it may be conjectured that an issue of so much importance will hardly be allowed to stand where it is without submitting the matter to further judicial opinion. The position now is this—that, under the Long Eaton judgments, it is wrong for electricity purveyors to say: "We "will supply you at such and such a price for power if you "use electric light, but the price will be higher if you employ "some other form of illuminant;" while, according to Mr. Justice Astbury, it is not showing any undue preference, if the electricity suppliers avoid making the distinction, and say to all power users alike: "You may use up to 20 p.ct. "of your power consumption for lighting purposes at power "rates, which condition, although you get your power "supply at such low charges, does not give you any undue "preference over consumers for lighting at lighting rates "whose time of use and *quantum* circumstances in respect of "lighting may be entirely similar to yours." It seems to us that Mr. Justice Astbury has imported into the legal position a discrimination as to classes of consumers, instead of giving full weight to the characteristics or correspondence of supply; he has pronounced the Hackney power consumers who are allowed to use up to 20 p.ct. of their power consumption for lighting as being totally innocent of receiving any undue preference over other similarly circumstanced lighting consumers; and he has totally ignored all those refined fundamental principles upon which electrical tariffs have been constructed, and which have given such marked distinction to charges for energy used for power in the day time and for current expended for lighting after nightfall. In fact, his Lordship does not consider the lighting consumer is at all concerned in the matter if he is not a power consumer as well, because, owing to this fact, his circumstances are not the same. If he has no interest in the matter, then why under ordinary circumstances has there ever been discrimination between power and lighting, with the result that the average money product of the latter has always been considerably more than that of the former? That there should be a difference is right; but that being a power consumer so alters all the principles that apply to the charging for lighting as to justify the power user obtaining his lighting at power rates, and yet not confer upon him an undue preference over other lighting consumers, is something that defies the appreciation of any but those with the subtlety of the legal mind, and of those electrical purveyors who want, apart from the low price for power, some seductive condition in order to obtain and to retain the power consumers.

However, in Mr. Justice Astbury's judgment, the Hackney power consumers, being all treated alike, there is no undue preference, seeing that the circumstances of the lighting consumer only are not similar, nor is his a corresponding supply. Though the lighting consumer has no similar power circumstances, his lighting circumstances may be both similar and corresponding, and (given equal charges per unit) more profitable than those of the factory owner. The power consumers want light precisely at the same time as consumers who use current for lighting only; and it is during the hours of the rise of the output curve for lighting that all disinterested electrical engineers will aver that the average cost per unit generated is greater. Notwithstanding, his Lordship holds that there is no undue preference in allowing some consumers to have current for lighting during these hours at a price considerably lower than other lighting consumers. He appears to have here entirely misconceived the position. Let us briefly examine the course of the reasoning pursued by him. He says, and rightly, that "power users have a better load and diversity factor than "light users, which accounts for their being usually charged "a lower rate." Just so. A lower rate for power, and from which lower rate they get a full and sufficient—in some cases more than sufficient—reward. But their position as power users, seeing they already obtain consideration in lower price, does not make them better lighting customers than other lighting customers so as to justify supply for this purpose at power rates. Sections 19 and 20 of the 1882 Act, in his Lordship's view, do not say anything about, and do not draw any distinction between, light, heat, or power users as such. But this surely depends on the definition of "corresponding supply." The Act of 1882 bears the title "Electric Lighting Act;" and, when it was framed and passed, lighting was the supply contemplated—electric power and heating being subsequent developments. In the case of the *Metropolitan Electric Supply Company, Limited, v. Ginder* (which his Lordship quoted), the cause of grievance was that a large consumer was supplied at a lower price than Ginder, and for a daylight supply, which was a special circumstance the Company were entitled to take into consideration. But in this case Mr. Justice Astbury allows the power user to superpose upon his requirement of power energy an additional amount for lighting at the (as admitted by all experts) most inconvenient time for a power station, and at power prices! If this addition came in the daytime, well and good; but it is drawn when required, which is when daylight fails. If it is true that the generating cost per unit increases during lighting hours, then both his power and lighting consumption *at that time at power rates* imposes upon the other lighting consumers a positive disadvantage. Again, that there should be a distinction between the charges for power and lighting supply is acknowledged by the prevailing custom, based on accepted principles, of making some difference in the amount of the charges. But prevailing custom and accepted principles are both knocked on the head by the 20 p.ct. lighting allowance to Hackney power consumers.

His Lordship rules that dissimilarity of circumstances and non-correspondence of supply must be looked for "in "the circumstances of the customer in so far as they react "upon the supply that he takes." Very well. This being so, the quantity of current that happens to be taken at power rates, when darkness sets in, beyond the day power supply must react detrimentally on the general lighting supply, and in this way detract from the advantage of the manufacturer's day load, which *per se* entitles him to a lower price per unit (which he gets) than the consumer who takes energy for lighting purposes only. Therefore it is difficult to agree that this Hackney system of charging the power consumers power rates for lighting is one that is "fairly "arrived at." If the system is not fairly arrived at, the fact would exclude it from his Lordship's dictum: "*If* the "different systems of supply are fairly arrived at, and are "at the choice of the customer, the preference prohibited "by section 20 is between customers dealing under similar "circumstances, and not between customers dealing under "different systems of supply, either of which they are free "to select."

The reference to the sanction accorded by Parliament to power companies to allow their customers to use for lighting up to 20 p.ct. of their power supply appears to be somewhat irrelevant to the issue in this case. Parliament, so far as we know, has never expressly permitted this power to any urban electricity supply undertakings, but only to power companies without any general lighting supply authorization, which differentiates them from those who have such general authorization. The permission was no doubt a concession to the convenience of the customer, as many factories dealing with power companies may be outside the distribution systems of urban suppliers; and, if they were not, there would be the inconvenience of having to trade with two electricity suppliers. Partly, too, the limitation to 20 p.ct. is probably a protection to urban suppliers. The fact that it is an express authorization applying to power companies only is against its application where there is no such express stipulation. If the arguments used by his Lordship are correct, what particular virtue is there in the 20 p.ct.? Why stop at this figure? Why, indeed, not allow the power customers to use energy *ad lib.* for lighting at power rates?—that is to say, so long as "all factory or power users are "put on one basis, and all non-power users on another." If the 20 p.ct. is not introducing some preference, some special advantage—for what purpose?—why concede it? There is no reason for doing so. And nowhere in sections 19 and 20 of the 1882 Act is any specific discrimination made between power users and non-power users—"similar "circumstances" and "corresponding supply" are the only guiding considerations.

It is true there are distinctions between this Hackney case and the Long Eaton one; but there is an equal importance in it to the gas industry, in that it curtails the freedom of competition both for the power and lighting of factories, which freedom of competition it is to the interest of the industry to protect. There is no announcement yet of any decision as to taking the matter to the Court of Appeal; but it is to be hoped the Gas Light and Coke Company will be advised to submit the point to the Higher Court. In view of the Long Vacation, his Lordship has granted the Company an extension to three months within which to give notice of appeal; so there is no immediate hurry.

Determining the Gas Production Goal.

Three of the gas papers that were read by technical members of the Birmingham Corporation Gas Department at the meeting of the Society of Chemical Industry, as reported last week, had the word "industrial" in their titles. Mr. E. W. Smith's contribution dealt with "Industrial Fuel "from Gas-Works;" Mr. W. J. Pickering's with "The "Calorific Value of Industrial Gaseous Fuel;" and Mr. C. M. Walter's treated of "Recent Developments in the "Industrial Applications of Town's Gas." Excepting the last-named title (although Mr. Smith referred to fuel other than gas, with gas taking foremost place), the reiteration of the term "industrial" might lead a layman to suppose that a special brand of gas is supplied by gas undertakings for industrial purposes; while, as a matter of fact, the gas that is of most general service—that will give the most value for money for the diverse purposes of industry, for private dwellings, public institutions, and catering establishments—is the one gas, subject to local conditions, that it is to the interest of the gas industry to supply. We must not forget in public discussions that, so far as gas is concerned, though big things are held in store for the gas industry by manufactories large and small and of all conditions of work, the domestic supply is the backbone of the industry's business, and for some undertakings practically the sole gas business, with, unfortunately, very little of the industrial kind intervening—"unfortunately," because the greater the diversity of day use, the better the load upon producing plant and distribution system, and therefore the greater the efficiency and economy.

This, however, by the way. There is one thing that at the moment the gas industry lacks, and that is an outlook, a goal, something definite to which to aim and to work for. We seem to be rambling leisurely about without any very good collective resolution, and certainly without any unanimous view of what is wanted, or what in the midst of the mutations of these times is the best course for the industry to pursue. The Government, through its war time organizations, appointed a Board of Fuel Research, a Coal Conservation Sub-Committee of the Reconstruction Committee, and the Board of Trade an Electric Power Supply Committee. Not any part of the work of these bodies has the gas industry in any way anticipated by research, by conference among its own men, and by coming to conclusions representing the approved technical and commercial opinion of the majority of the industry. The National Gas Council delegated to a Committee the work of following up the doings of these Government and Departmental appointments. After the local authorities and railway companies had been investigating the question of inert constituents in gas, and had found not a few town supplies sadly wanting in a reasonably good character in this respect, and after it had been pointed out that better by far is it to seek economy with cheaply made good combustible gas than false economy by depraving the flame temperature of gas and defaming reputation with keen competition all round, the Institution of Gas Engineers, in conjunction with the Leeds University, appointed a Committee for the purpose of research, with a view of eliciting guidance in improving and at the same time economizing in the production of gas. The Committee have mapped out a programme. But before the members can get seriously to work, the Board of Trade refers practically the same question to the Board of Fuel Research; and the gas industry is again found unprepared. It has no settled views on the matter, no finished plans, nothing concrete to place before the Board unless it be the private work of a few of the more enterprising of our gas undertakings.

It is a great pity. But it is the conventional way of the gas industry. It would be against its traditional character to be doing, without conditions forced action, co-operative work that had for its aim technical development. From this old habit we have to part. The industry must in future lead, and not be led. It must adopt its own policy, it must search out new practices that promise economy and higher efficiency either in production or use, and it must be so certain of its ground that it can educate and carry conviction to those who stand through nescience blocking the path of progress. And it must not be afraid to approach Parliament with its schemes, and prosecute them vigorously, and not take the first repulse as defeat. Mr. Smith (according to the reported abstract of his paper) says there is no doubt that the railway companies who, as large consumers in numerous gas-supply areas, are bent on having the inert gases in town gas limited, would not be satisfied with a good quality blue water gas of 300 B.Th.U., even if in that case the inert gases were less than in a good coal gas. No one wants them to be content with a blue water gas of 300 B.Th.U., but with a mixture, a percentage only of which would be gas of that variety. Of course, the blue water gas would have to be of good quality, or, as pointed out by Mr. Smith, the inert gases would be high. But no gas engineer would surely be foolish enough to supply a bad blue water gas when it is not a difficult matter by simple and proper regulation to make a gas with not exceeding 6 p.ct. of carbon dioxide in it, and (say) between 3 and 4 p.ct. of nitrogen, or a good 90 p.ct. combustible gas. If, as a result of the inquiry by the Board of Fuel Research, the Board of Trade are advised that there will be national economy in the provision of a good combustible mixed gas, we may be very sure there will be some accompanying restrictions which will give no room for carelessness or for imprudence. Mr. Smith has seen furnace work done with 300 B.Th.U. blue water gas; and the expenditure of B.Th.U. per lb. of metal compared favourably with that when using a good coal gas. The point about this is that the blue water gas units are produced more cheaply than are coal gas units, which at once points to the fact that economically the industry and the consumer are going to be prejudiced if a calorific value standard is instituted which prevents the pursuit of economy in legitimate directions. Mr. Smith cannot find any economic or scientific reasons for having fixed on 500 B.Th.U.; nor can anybody else who has really studied the question in all its bearings. Although a 500 B.Th.U. gas has been turned out by a number of gas-works, so far it has not been possible, he says, to produce such a quality of gas from average coal, using the ordinary methods of carbonization. We well remember the time when from Birmingham there was advocacy of a higher net calorific power than the present gross standard. But evidently broader thought on the subject has set in; and economy of production, economy of use, and the conditions actually here and with presaged proximity, are seen to have a co-relation that cannot be neglected.

In the reference to the Board of Fuel Research, they are requested to keep in view, in considering the question of the composition of gas, the secondary products of coal carbonization. Gas, of course, will continue the prime product. At the same time, there is no reason why gas should always be regarded as the product to which all else is subservient. Each product should have equality of attention. Those to which we used to apply the term of "residuals," which degraded their importance, have had their plane of usefulness raised during the war. "Secondary products" or "bye-products" should only be a term of classification. They are secondary to gas in no other respect. They are such an integral portion of the industry's work and business that they should not be relegated to any inferior place to gas, and more especially as this is a direction from which a big development in the economic position of the industry is going to be derived. In connection with its secondary products, the industry should see to it that its proper position in relation to after-war reconstruction is fully appreciated and taken into account. It is obvious that a cheap supply of good combustible gas is a necessary to post-war trade expansion. But there is all the crude benzol recovery, oil-debenzolizing, tar distillation, and dehydration plants that have been incorporated for national service in gas-works processes; and this is a line along which there can be large development in the gas industry, to the great advantage of the dye, motor-car, and other industries. Dr. Addison, the new Minister of Reconstruction, when Minister of Munitions, learned a great deal about these matters. In his new office, he is "to consider and advise upon the problems which may "arise after the termination of the present war, and, for the "purposes aforesaid, to institute and conduct such inquiries, "prepare such schemes, and make such recommendations "as he thinks fit." Among the schemes which he should, we consider, think fit to prepare should be one dealing with the gas industry's secondary products, including full liberty, to individual or groups of works, to develop them on the most economical lines without interference by parties interested for personal profit in curbing such development, or by short-sighted retarding legislation. Is the gas industry prepared to assist Dr. Addison in this matter?

We hope the Board of Fuel Research and the various Committees that have these matters now under considera-

tion will be able, without any delay greater than thorough investigation demands, to supply the gas industry with an outlook and focus the attention of its technical men on the goal for which they should work. Its principal competing industry is getting ahead of it in its investigation for economy, because it is seen that through economy, and that only, can come the cheapness that will gain the largest measure of commercial service. Between the two industries the struggle will be keen. The one offering the most economical service will lead in success; the greater the economy separating the one from the other, the greater will be that success.

The Meeting and the Dividend.

The Directors of the Gas Light and Coke Company have resolved to take advantage of their new Act, and not issue a report or statement of accounts for the past six months, nor hold a half-yearly meeting. This will, of course, save expense, labour, and inconvenience. It will also for the first time prevent our usual half-yearly investigation of the accounts, and thus will cause a break in a long journalistic custom, as well as in the completeness of the half-yearly review of Metropolitan Gas Affairs. We shall be left now with the South Metropolitan Gas Company and the Commercial Gas Company to give us an interim account of how gas affairs are proceeding in London itself, apart from the suburbs; and, of course, the time may come when these Companies will also follow the new fashion of holding only annual meetings. No doubt the proprietors of the Gas Light and Coke Company would have preferred, in these inordinate and momentous times, to have continued the half-yearly accounts and meetings; and this desire will be accentuated when they see the disastrous effect of the war time operation of the sliding-scale upon the dividend on their ordinary stock. The holders are to receive a dividend at the "statutory" rate of £3 14s. 8d. p.ct. per annum, which means £1 17s. 4d. p.ct., less income-tax, for the half year. The net receipt will be approximately 1½ p.ct.! The conditions of the times are not at all pleasant; but had the Royal Assent to the Company's Bill been deferred a few weeks, the proprietors would have had one more half-yearly meeting with their Directors. As it is, some will be pondering unaided the question as to how much their incomes are likely to be further reduced with outgoings constantly ascending, despite controllers for this and controllers for that.

Coal Topics.

There is a live interest everywhere as to the form financial control of the coal industry is to take under the Government control scheme. The coal owners know the lines of the draft scheme, of the Coal Controller; and, until there is an official divulging their mouths are closed up by the Defence of the Realm Act, which is found useful for innumerable purposes. But it is clear that coal proprietors are getting very chafed over the proposals; and now and again vent is given to irritated feelings. There was one of the members of the Board of the Ebbw Vale Steel, Iron, and Coal Company the other day (Mr. Beynon), at a meeting of the shareholders, asserting that the coal trade more than any other had unhappily come under the "blighting influence of Government control." But whose the fault of this—if true? The origin of control is found in the fact that the country—its people and its industries—were not only coming, but were soon under, in the early period of the war, the blighting influence of the coal trade. Hence the Limitation Act, and finally control. Mr. Beynon also said: "Enough is known for me to say that 95 p.ct. of the excess profits of the coal trade of the country will be taken either by the Controller or the Government; the fate of the other 5 p.ct. is problematical." From another source, it is to be gathered that the terms of financial control are now being put into legislative form, and will soon come before Parliament. Talking of control, there is also the coal distribution scheme. Mr. Calthrop is receiving suggestions for modification, and is patiently considering them with his advisers to ascertain if they contain the germs of improvement. It is understood that some slight modifications have been already secured; an important one being that Leicestershire has been added to the districts from which area No. 13 may draw supplies. On top of these important matters, the miners are again getting restless. Something is to be done in regard to the regulation and reduction of food prices, or (so say the Miners' Federation) they will want another 25 p.ct. per day added to their wages. The men are already getting daily fixed wages ranging from 9s. 5d. up to round about 11s.—most districts being in the neighbourhood of the latter figure. It is fortunate that a coal magnate is Food Controller, as Mr. Calthrop will look with confidence to him to disperse the new cloud which has been raised by the miners.

Six Months' Coal and Coke Exports.

The Board of Trade returns for June disclose how well the coal proprietors have continued to stand in relation to the values received for the much lower quantities of coal exported. This had been traceable from the almost unbroken tale of the monthly figures. Last month the quantity of coal, coke, and patent fuel exported was 3,666,068 tons, which was a reduction of 59,355 tons on June, 1915, and an increase of 162,113 tons on June, 1916. But the value of the exports last month was £4,899,526, which was an increase of £1,575,068 on the lower quantity exported in June, 1915, and even last month's values scored an increase of £147,549 over June, 1916, when 162,113 tons less were exported. This difference is reflected in the average value of the coal, coke, and patent fuel being reduced from £1 7s. 1d. in June, 1916, to £1 6s. 9d. last month. In the six months, the exports have been brought down, compared with the corresponding period of 1915, by close upon 4 million tons; but the value has gone up by no less than £7,121,489. This is a healthy condition. Compared with the first half of 1916, the value increased by £2,559,386, while the quantity exported went down by 1,043,316 tons. The exact figures for the six months [January to June] of the three years were: 1915, 23,377,174 tons; 1916, 20,504,687 tons; 1917, 19,461,371 tons. Values: 1915, £18,741,058; 1916, £23,303,161; and 1917, £25,862,547. The quantity exported during the six months was at the rate of about half that for the year 1913, which was one of exuberant demand; but the value now is about double that of 1913. Nevertheless, the coal industry is always finding cause for regret. The same value for half the coal exported! The other half still available for business elsewhere or at another time. Yet the reason now advanced for tearful discontent is that the collieries chiefly concerned are not working on such an "economical basis." Well, there is no pleasing some people.

The Union of Manufacturers.

In connection with the reference made on p. 141 of last week's issue to the registration, as a company limited by guarantee, and not formed for the purposes of profit, of the National Union of Manufacturers (Incorporated), we are now able to add that Mr. W. Beckford Long, the Secretary of the Gas Light and Coke Company, has been elected a member of the London Executive Committee. The inclusion of the name of Mr. F. M'Leod, the Secretary of the South Metropolitan Gas Company, has already been notified; so that the Gas Companies of the Metropolis are strongly represented in the Union. There are, besides the London Executive, two local Councils of the Union—one in Birmingham, with Mr. George Pike, of Messrs. John Yates & Co., Ltd., as Hon. Secretary, and the other in Sheffield, the Hon. Secretary of which is Mr. James Dickson, of Messrs. Henry Rossell & Co., Ltd. From these gentlemen, prospective members in the areas named can get all information they may desire. Full particulars can, of course, also be obtained from the Hon. Secretary in London—Mr. G. R. Cheesman, of No. 11, Paternoster Square, E.C. 4. The growing membership of the Union [which was formerly the British Manufacturers' Association, 1915] calls for a move at an early date to larger and more convenient premises. Though readers who may feel they would like to become members can learn anything they desire to know from the London Administrative Office, one possible query may be forestalled by stating that the minimum subscription is five guineas a year.

And the Federation of British Industries.

Another organization which is taking up an important position in the industrial world is the Federation of British Industries, of No. 39, St. James's Street, S.W. 1; and a word may be added here to draw attention to some recommendations this body are making for the development of the Government service for the promotion of British trade in foreign countries. The present position, as explained by the Director (Mr. R. T. Nugent), is that

a Government Committee, considering the question of the proposed reform of the Consular service, with the object of linking it up with trade and industry at home, heard recommendations from the Federation and from the Chambers of Commerce, as well as other evidence, and then issued a majority report and a minority report, which the Government have up to now refused to publish. The Federation desire to urge the need of altering existing conditions. It is pointed out that after the war the country's ability to pay its debts will depend on efficiency of production at home and on ability to sell its products abroad, in the face of highly organized competition. At present, foreign countries are dealt with by the Foreign Office (Consular Service), while the home market is handled by the Board of Trade. The first of the Federation's recommendations is that all activities undertaken by the Government for the promotion of British trade in foreign countries should be concentrated under the control of a single responsible Department; and another that, for carrying out this foreign commercial policy, a well-organized Commercial Branch should be added to the existing Foreign Office, working in the closest possible co-operation with the Political Branch. There are a number of other recommendations, for particulars of which readers must be referred to the Federation. The point to be emphasized here is that the Federation are apprehensive lest a final Government decision on the matter should be taken without consulting the industrial and trading interests in this country, which are chiefly concerned. Thus it is desired that publicity should be given to the facts.

Japanese Trade in Sulphate of Ammonia.

The British Commercial Attaché at Yokohama reports that the sulphate of ammonia imports into Japan from the United Kingdom have for many years past formed one of the principal lines of business between the two countries; but owing to the war the trade has been seriously interfered with. He shows what the imports of sulphate have been, and what proportion they bear to the total imports from the United Kingdom. According to an expert, the domestic supply of sulphate of ammonia in Japan was 37,600 tons for 1916; and the estimated output for 1917 will probably be 50,000 tons, which is still less than half the imports of 1914. For the four years 1913-16 the total imports of sulphate into Japan were: 110,635 tons, 104,800 tons, 19,790 tons, 7107 tons —all of which came from the United Kingdom except 2397, 1041, 1981, 4114 tons (respectively). He adds that there are in contemplation three new factories for the production of calcium cyanamide; but they are not working yet. Since the war, practically all the calcium cyanamide produced is being converted into sulphate of ammonia.

Principles of Industrial Administration.

A series of well-thought-out articles on a subject now engaging general attention, which appeared originally in the "Iron and Coal Trades Review" have been reprinted (with some considerable alterations) in more compact form as a book. The topic on which they treat is the "Principles of Industrial Administration." The author is Mr. George E. Toogood, who foresees that the time is coming when the industrial administrator—whether as statesman, employer, labour leader, or manager—will have to be more closely acquainted with the scientific aspects of his work, especially as regards the human factor. From this point of view, what he has to say may be commended to the careful attention of those whom it concerns, although no pretence is made to do more than sketch in the merest outline a sort of foundation plan of a structure which will be the work of many hands and brains. In the final chapter consideration is given to "Welfare Work," there being an account by the author of some investigations he has made, and which he thinks may be of interest to employers who have not as yet paid serious attention to this branch of applied science. While Mr. Toogood admits that, in the many subdivisions of what is termed welfare work, the Ministry of Munitions have secured throughout the vast works under their control a uniform policy of care and consideration for the worker as an individual which approximately corresponds to the highest level attained by the most progressive private firms before the war, we are glad to notice that he does not omit mention of some of the most prominent of the men on whose spade work the Welfare Section of the Ministry have thus built-up their administrative policy. Two of the leaders of industry named in this connection are Sir George Livesey and Sir Robert Hadfield, Bart. The book is published by Messrs. A. Brown & Sons, Ltd., of No. 5, Farringdon Avenue, E.C., at the price of 1s. net.

South Metropolitan Gas Company's Dividend.—At the half-yearly general meeting of the Company to be held on the 15th prox., the Directors propose to recommend payment of the statutory dividend at the rate of £4 13s. 4d. p.ct. per annum.

PERSONAL.

The distinction of Chevalier of the Legion of Honour has been awarded to M. Louis A. M. Cros, Manager of the Boulogne works of the European Gas Company. M. Cros is Captain in an artillery regiment.

The Leek Lighting Committee tendered their thanks to Mr. R. H. Ginman (the Gas Engineer) for the assistance given by him during the past year in connection with the electricity undertaking, and recommended that his salary be advanced from £250 to £300 per annum, which the Council have agreed to.

Mr. H. B. Heath has retired from his position as Secretary of the Plymouth Gas Company, and Mr. George H. Bolton, who has been Assistant Secretary for the past four years, has been appointed Secretary. Mr. Heath had been in the service of the Company for the long period of 48 years, and filled the office of Secretary for 17 years. His resignation is due to ill-health.

Lieutenant A. Broadfield Cohen, of the West Yorkshire Regiment, who is reported to have been seriously wounded in action, is a son of Mr. Julius B. Cohen, Professor of Organic Chemistry and Dean of the Faculty of Science at Leeds University. The Lieutenant was himself a student at the University, and a member of its O.T.C., prior to the outbreak of the war.

Wireless Operator Harold Woodward, the son of Mr. J. H. Woodward, Manager of the Skipton Gas-Works, is at home, recovering from recent trying experiences. He was, under sealed orders, on board a collier transport which was sunk by a German submarine about 100 miles from land. Three firemen were killed. The survivors were three days and nights in open boats, in rough weather, before being picked up by a ship.

After seventeen years' service as Manager of the Scunthorpe Gas-Works, the Urban District Council have accepted the resignation of Mr. J. W. Turner, who went to Scunthorpe from Torrington. When he was appointed, the Frodingham Iron and Steel Company, Ltd., were supplying gas to the town, the population of which was then estimated at about 5000. Mr. Turner has seen the population grow by nearly 20,000, and the number of gas consumers from 185 to 3472.

We are pleased to learn that Captain J. Lennox Stewart, M.B., B.S. (the only son of Mr. James Stewart, the Editor of the "Gas World"), who is attached as medical officer to the Gordon Highlanders, and who was awarded the Military Cross last year, has now had a bar added for conspicuous gallantry and devotion to duty. The official record sets out that he behaved with the utmost gallantry in removing the wounded under shell fire. He continued to work in the open, exposed to severe shell and machine gun fire, until every wounded man had been brought in. Captain Stewart has been in the field almost continuously since the war began.

Conserving Fruit and Vegetables.

A topical subject has been selected by the British Commercial Gas Association for the August number of "A Thousand-and-One Uses for Gas." It is "Conserving the Nation's Produce of Fruit and Vegetables"—a matter of prime importance at a time when despairing efforts are being made by our enemies to reduce the country to starvation. In order that the fullest possible benefit may be derived from the tremendous efforts that have been put forth to increase the crop of fruit and vegetables, it is, of course, essential that the marketing of the produce should not take place all at once; and therefore the authorities are urging growers to instal evaporators, so as to enable them to dry their surplus fruit and vegetables, instead of sending them to overstock the market. The article before us illustrates and describes different forms of evaporating apparatus for this purpose—both gas and coke heated. All the machinery, too, for making the plant at the works of the British Fruit Evaporator Company is stated to be driven by a gas-engine. The aspects of the matter here referred to are those which appeal to the nation, and from their own special standpoint to the gas industry. But the individual consumer, as such, has also an interest in the subject; evaporation, as explained, is a clean process. The consumer will realize how nearly the question concerns him if he reads what is said about the methods hitherto adopted for drying grapes in Spain and sultanas in Afghanistan.

Calorific Standard Application and Orders.—The Board of Trade have received an application from the Derby Gas Light and Coke Company for an Order fixing a calorific standard of 500 B.Th.U. The Board have made Orders for the Clevedon (Somerset) Gas Company and the Winchester Water and Gas Company.

Natural Gas in Kansas.—According to the latest authoritative figures, the States of Kansas and Oklahoma produced in 1914 22,627 million c.ft. and 78,167 million c.ft. respectively, or a total of 100,794 million c.ft., of natural gas. The total natural gas consumption of the United States for the year named was estimated at 591,866 million c.ft., which would credit the Oklahoma-Kansas field with about 18 p.ct. of the supply.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Annual General Meeting.

The Fifty-Eighth Annual General Meeting of the German Association of Gas and Water Engineers was held on June 22, at the premises of the Association of German Engineers in Berlin. The following summary of the proceedings is taken from the reports in the "Journal für Gasbeleuchtung," by the official reporter of the meeting, Herr Heidenreich. The first portion is a general review by him of the circumstances in which the meeting was held, and the second portion the minutes of the proceedings.

Review of the Meeting.

The proceedings, like those of the two preceding years, were restricted to a single day, and were shorn of the festivities of earlier years, though there was an informal gathering of members at the Zoological Gardens on the evening of June 21. About 370 members and visitors attended the meeting, which was a larger muster than had been anticipated; and, as the meeting hall at the Association of German Engineers has seating accommodation for only 250 persons, a considerable proportion of those attending the meeting were obliged to stand throughout the proceedings—the fact that they were content to remain in such conditions being proof of the general interest aroused by the programme. The large attendance also testified to the wide-spread desire of members for an opportunity for a private exchange of views on the experiences of the present time.

Gas-works are now in a serious economical position. Coal supply has overshadowed all else for some months past. Negotiations and conferences have so far effected no improvement; and the gravest fears are now entertained for the autumn and winter. The meeting stood under this cloud; and it was the question of the coal supply which was chiefly responsible for the large attendance. No one could have expected that the meeting would solve the problem, and send him home with the key to the solution in his pocket. But everyone left the meeting with the conviction that the interests of the gas industry—with all that they mean for the commonweal and the fatherland—were being cared for by the Council of the Association in the best and most vigorous ways possible in prevailing circumstances. This was especially true of certain projected measures, conceived with the best possible intentions, but with lack of insight into the great economic importance of gas supply, which would certainly have produced a catastrophe. Especially are thanks due to Herr Häse, of Lubeck, the President of the Association, who has busied himself in preventing damage to the industry, and, so far as measures have been necessary, for restricting the coal requirements, has seen to it that they were formulated in a sensible and just manner.

Matters handled by the President and disposed of in the proceedings of the meeting from the point of view of the expert included: The elucidation of the industrial conditions, free discussion on the experiences of members, the adoption of preventive measures against threatening troubles, the establishment of the proper lines for future work, and the enlightenment of the influential government offices and public authorities as to the further development of the work of the industry.

The Inaugural Address of the President, delivered with his customary skill, was received with rounds of applause. He reviewed the strategical results of the efforts of the German and its allied armies, as well as the industrial loss caused by the war, and the interruption of idealistic achievements. The President next gave his paper on "The Position of Gas and Water Works in War Time," which was the only technical item of importance on the programme. From carefully compiled material and data, he demonstrated the immense importance of the gas and water industries both for the general welfare and the conduct of the war. The reading of this paper was followed by a general discussion on the coal supply, the coal-tax and its effect on the economic position of the gas industry, the storage of coal, the disposal of bye-products, the heating problem, general gas-works questions, and the use on gas-works of electromotors unattended by risk of causing explosions. Finally, some water-works questions were also discussed. A full report of the whole discussions is promised later.

The internal business of the Association was next dealt with. Herr Geyer, of Augsburg, was elected as one of the two Vice-Presidents of the Association in succession to Herr Terhaerst, of Nuremberg, whose term of office had expired. Herr Häse, the Manager of the Gas, Electricity, and Water Works of Lubeck, was re-elected President of the Association, whereby he enters on his third year of office.

The business of the meeting having been finished, the members assembled at the Rheingold Restaurant for an informal luncheon, and a large proportion of them returned there for the evening repast. On the latter occasion, the President communicated the result of an interview which he had had with the Imperial Commissioner responsible for the distribution of coal. Members parted with expressions of hope that the ensuing year would bring forth peace, and that the next annual meeting would be held in more favourable circumstances.

The review of the proceedings concludes with a retrospect not only of the years of war, but of the earlier years of peace, when so many representatives of countries now at war with Germany attended the annual meetings of the Association. It is said that the last meeting in peace time—viz., that at Munich in 1914—calls to mind the Gas Exhibition held that year in that city, which drew visitors from all the nations now at war. Carrying the thought back further to the time of complete harmonious understanding with England, now Germany's "chief enemy," who, in the autumn of 1910, when numerous representatives of the German gas industry were so hospitably entertained in London, Edinburgh, and Glasgow, could have dreamed that things would have developed as they have? Even at that time though, relations with Germany were a little strained by the English jingo Press. But in one of the speeches of welcome, a distinguished English gas engineer expressed the hope that the sea would always be large enough for the two navies to manœuvre without clashing, while on the last day one of the English hosts spoke of his "German brothers." Who would have thought at that time of the Skagerrak or the clash of our armies on the blood-soaked fields of France and Belgium? How many peaceful relations between the warring nations have since been broken! Is it everywhere, and for ever?

When the world returns to its senses (the retrospect concludes), and new ties are formed between the nations now at war, many old ties also will await resumption. It may be hoped that, in England as well, people will not generally think so chauvinistically as the technical papers which reached Germany some time ago disclosed. So far as is known, two respected members of the German Association, Herren L. & E. Körting, still appear in the roll of the Institution of Gas Engineers as honorary members; and, so far, no one has suggested that Sir William Lindley should be struck off the list of members of the German Association any more than any other of all the hostile alien members of that body. May better understanding soon bring about a peace which is honourable for all, so that the industries represented by our technical institutions can enjoy further successful development!

(To be continued.)

ELECTRICITY SUPPLY MEMORANDA.

There is no recollection of the event, but we accept the statement of the impeccable "Meteor" of the "Electrical Times" that it is so. He asserts that some five or six years ago, he announced how important it was from the military and national point of view to control all public lighting independently of the ordinary distributing mains. This was said, we feel certain, without our friend being in any way in the confidence of the All-Highest or any of his infamous satellites; though, of course, there was nothing new in the idea of methods of prompt lighting and extinguishing of street-lamps. In various places, it was then already in existence in connection with the control of street gas-lamps by the pressure-wave system, which, unlike electricity, does not need a separate circuit. However, "Meteor" thinks that it would have been an inestimable blessing during the war to have had separate electric circuits for public lamps, so as to have given immediate control over them. It would also have vastly altered and simplified the condition of things had the appliance necessary for the pressure-wave system been applied wherever possible before the war to public gas-lamps. "Meteor" also describes the suggestion of certain correspondents of the "Daily Mail" as a very "sensible" one, that the public electric lights should be used for signalling raids; and then he proceeds to show that the "sensible" suggestion is a very foolish one in these days, in view of the fact that the street-lamps have been so badly dealt with by paint and shades that no one would be conscious of their illumination if the sun was exerting its strength. But there is another aspect of the matter. The lighting-up of the street lamps would be of no use whatever as a signal to people in houses. It would have been no use on the morning of last Sunday week when people were having a final snooze in bed, or were engaged on their matutinal ablutions, and the sound of aerial explosions sent them smartly to the safest quarter in their houses. What good would the lighting of the street-lamps have been on that occasion, or the policeman with his silent "Take Cover" notice?

Signalling Raids.

But "Meteor" goes further. He thinks this separate circuiting of the public lamps would be for the public welfare; and therefore the electric undertaking concerned should not have to foot the bill for making the change. Why not? The system would save a certain amount of labour. Lighting authorities or gas undertakings have had to pay for automatic lighting and extinguishing devices, and for the application of the pressure-wave system. However, the electrical industry was always great in the matter of getting other people to pay. The ratepayers have to pay where, in the case of local authority undertakings, there is mismanagement or under-charging. "Meteor" thinks, too, this is only a minor example of the burden that the nation may have to shoulder if it is to derive the maximum benefit from electricity supply. For instance, if the conservation of our fuel supplies requires that there shall be a complete revolution in the generating practices of the industry—well, the State should pay for effecting the change. The electricity industry says

State Aid.

"Meteor" could not possibly countenance the loss that would be entailed; neither ratepayers nor shareholders would put up with it. But the State might do so deliberately, since in the long-run it would repay it handsomely to disburse this cost of initial establishment. In other words, the State ought to pay to get the electrical industry out of the uneconomic mess in which it finds itself. "Meteor" has wonderful faith in the State. He does not know it. He has never heard of Shylock the Jew and the prodigal son being participants in that wonderful thing known as the State. The gas industry has had to pay for much work in connection with the recovery of various products for war purposes; and it gets fixed paltry amounts for the products, which do not pay some undertakings, and leave them with an actual loss. Gas undertakings may grumble. The State is thick-skinned, and is used to that. It commands and commandeers; it is paramount, it makes its own rules and determines its own payment, without so much as "by your leave." In some cases it is parsimonious; in others prodigal. It is too much to expect the State to tread a straight line midway between the extremes. The electricity supply industry must not look for presents from the State just now.

The Coal Controller's Advice.

Among the Coal Controller's recent recommendations for the saving of coal carriage and traffic next winter was the one that the installation should be pushed of both gas and electric cooking and heating appliances. There are two drawbacks in some districts so far as gas is concerned—one is the comparatively few fitters left; the other is that last heating season on several cold days the gas plants had to bear continuously flights of 40 to 50 p.ct. increases in demand, besides having to meet the high peaks for cooking for the midday meal, and for cooking in the evening on top of the lighting load. The elasticity provided by storage and water-gas plants is curbed by the oil difficulty to the degree that blue water gas can be mixed with coal gas without unduly depreciating quality. And extra gas-producing plant is as precious and difficult to get as many other commodities in these days. But the providers of electricity are in worse case. How many of them could stand beyond the normal demand the continuous strain of a 40 to 50 p.ct. increase in output for days together, with intermittent demands for cooking such as the gas industry has to face? Plant, cables, fuel supplies would not stand anything of the kind. Unless, too, coke is employed under the boilers, electrical stations also destroy all the value that is in the coal for the one purpose of raising steam. Recommendations are very well, if practicable. The electrical people are pressed for wiremen and fitters, as is the gas industry for skilled labour. From the consumers' point of view, there are other considerations. Electric cooking and heating appliances are relatively expensive in first cost and upkeep; and the cost of using them is something that makes even Park Lane pause. Prices for electric current for heating purposes have lately gone up in many places. For example, we see that Stoke Newington has raised its heating charge to 2d. per unit. A couple of units used in a room per hour means 4d.; for twelve hours' use on a cold day in the room the heating expense would be 4s. Allowing 75 p.ct. efficiency for a modern gas-fire, the same amount of B.Th.U. (presuming for the sake of generosity 100 p.ct. efficiency for the electric heater) could be transferred to a room by the expenditure of from ½d. to ¾d. per hour for gas at war prices. Another point is this: Assuming an average use of 4½ lbs. of coal per unit generated, two units would mean the consumption of 9 lbs. of coal, which at 14,500 B.Th.U. per lb. would be equal to 130,500 B.Th.U. There would, of course, be no occasion to consume this amount of coal per hour for heating an ordinary room, but supposing it was so used in a coal grate with 20 p.ct. efficiency, the householder would project some 26,100 B.Th.U. into his room, as compared with 6840 B.Th.U. by electricity—granting, we repeat, for the sake of generosity, 100 p.ct. efficiency for the electric-heater. The 9 lbs. of coal and the 26,100 B.Th.U. would cost the householder, at 34s. per ton, just under 1·7d., compared with the Stoke Newington 4d. for 2 units of heating energy and 6840 B.Th.U. Of what advantage in the matter of fuel economy would the change be to the householder or to the country? The 9 lbs. of coal would produce (without reference to coke and the other secondary products) 50½ c.ft. of gas, which would on combustion give, at the parliamentary standard of 500 B.Th.U. per cubic foot, 25,250 B.Th.U. This quantity of gas could be purchased (at 3s. per 1000 c.ft.) at 1·8d.; and it would with the modern gas-fire give to a room 18,936 B.Th.U. A couple of units of electricity used per hour would not have gone far in the heating of a decent-sized room on the severely cold days last winter. The Coal Controller is, of course, considerate in giving the householder the choice of two labour-saving methods of heating; but the householder will no doubt be careful to make selection of the one that best suits his own pocket. Some gas undertakings, like the coal merchants, are at the present time suffering from no little embarrassment owing to the importunities of local authorities and householders in connection with cooking and heating appliances.

The "Increasingly Popular" Electric-Heater.

However, there is great joy in the electrical industry when a few more units of electricity are sold for heating purposes. The writer of "Heating and Cooking Notes" in the "Electrical Times" says that at Winchester there was last financial year the "gratifying increase" of 54,152 units used for heating and cooking. The Electrical Engineer (Mr. R. Ayton) in his report only mentions "heating purposes" and not cooking; and he thinks the increase is "most satisfactory." The twelve months included the severest winter that has been known for many years. Mr. Ayton considers the use of electrical energy is becoming "increasingly popular;" and he thinks that the inquiries received show that consumers of energy for this purpose are "generally" satisfied with the results. Assuming that Winchester uses an average of 4½ lbs. of coal per unit, the increased consumption of electricity for heating would mean the expenditure of about 108·8 tons of coal, from the use of which coal in their coal grates householders could have obtained much more heat for room warming. The additional units referred to are equal to 185,199,840 B.Th.U., or 370,399 c.ft. of gas. At 3s. per 1000 c.ft., this quantity of gas can be purchased for £53 12s.; at 3s. 6d., at £64 15s. There is a vast difference between these figures and the £225 12s. 8d. which the 54,152 units cost the consumer, assuming a charge of 1d. per unit. And the electric heater while it is credited in the lecture room by professors with 100 p.ct. efficiency, can truly claim nothing of the kind. So, again, there is a disadvantage in comparison with solid fuel and gas—particularly the latter, because of the cheapness of installation and upkeep. Labour saving over solid fuel is, of course, about equal between gas and electricity; but reliability stands higher with the former than with the latter.

Simpson's of the Strand.

The same writer of "Cooking and Heating Notes" is much exercised over the recent case in which Simpson's of Strand fame were concerned. They were summoned for using a quantity of meat in excess of the allowance for the number of meals served to customers. Sir Archibald Bodkin, of course, had to make out the best possible case for his clients when before the magistrate; but we think—in fact, we are sure—that he must have fallen into error when he said that the 5-oz. allowance of meat per customer came down to 2½ oz. after the meat had been cooked. On the face of it, this is a "loss" of 50 p.ct. The "Cooking and Heating Note" writer, by the use of "Ifs," obviously has some doubts as to whether Sir Archibald was not inadvertently stretching the wastage a bit. He does not wish to write himself down a witless fellow; yet he cannot avoid making the most of Sir Archibald's statement. That dear old lady—Mrs. Beeton—never, not even in the days of her youth when efficiencies were not as they are now, credited gas or coal with a wastage anything like that figure. No hardly-pressed electrician for a point with which to attract the public ever ventured into so vast an extravagance; and even the much lower percentage that the electricians have appropriated from Mrs. Beeton, or by copying apocryphal statements, they have refused to support by having tests carried out at equal temperatures and to equal degrees of cooking in open competition. All along it has been a pretty little game of deception to secure custom. Of course, our friend who has fastened on to this statement of Sir Archibald very well knows that at a place like Simpson's, with their knowledge of what their customers want, and with their reputation for choice cooking, do not waste 50 p.ct. of meat in its preparation. But he has a recommendation to make; and it is that electric cooking should be adopted, which would (so he says) result in only about 10 p.ct. of waste. Our all-knowing friend puts it that a customer would then receive 4½ oz. of cooked meat instead of 2½ oz. as at present. Would he? If he will make inquiry, he will probably find the 5 oz. allowance includes bone; the portion placed on the plate of each customer is *minus* the bone. He understands that both coal and gas are used at Simpson's; and he concedes that no doubt the apparatus is as efficient as is possible with such means of heating. Of this, we cannot speak. But there is gas cooking and gas cooking apparatus. We ask him to justify the 50 p.ct. loss of meat with "the reputation for good cooking justly held by Simpson's;" and to explain how a reputation for good cooking could have been earned with gas and coal apparatus. While he is about it perhaps he will tell Simpson's as to the limitations of the electric-range which are not compensated by lower costs, greater convenience, a larger range of regulation of temperature, a greater latitude from rapid to slow cooking, and a bigger range for boiling operations than the gas-cooker.

Troubles of Arc Lights.

Arc lighting seems to be in a bad way for street purposes. It is a jumpy, independable, labour-wasting system; and so, in order to save the face of electricity, the more sober, but eye-smiting gas-filled (or so-called "half-watt") lamps are taking the place of arcs. Some of the troubles occasioned by such lamps have recently been told in a London County Court, when a taxicab proprietor—one Prust—sued the Westminster Corporation for damages to a taxi-cab, caused by a collision with another cab owing to, he alleged, the Corporation having negligently allowed the electric light to "go out" at one standard. For the defence, it was pleaded that, though the very best carbons were used, they would at times fail to drop properly, and out would go the light. The Westminster Corporation it appears keep three men constantly on duty to attend to light failures. They even "pay the police to give them information of any failure of light." On this occasion, the Corporation were informed that the light had gone out, and sent as quickly as they possibly could; but unfortunately the accident occurred in the meantime. It is clear the electric arc lamp would not, among public lighting agents, take first prize for reliability.

HOLIDAYS: AN ADDENDUM.

By A. C. W.

It is gratifying to one who, in the intervals of business, occasionally gives public expression to thoughts on some subject of general interest, when he receives spontaneous words of commendation. The writer's short article on "Holidays" [see "Journal," June 19, p. 567) has called forth such words from several quarters. Those from a member of the Town Council of Edinburgh are so wise and so well-expressed that they deserve publicity:

I was greatly interested in the little article on "Holidays," and in the remark of Burke's which you quote. The pressure of war work and war conditions reminds us of its urgent truth. We continually forget that the mind, no less than the body, must from time to time retire to the quiet retreat. This incessant work, which for many rapidly becomes a mechanical process, is starving character, and results in the loss of a great deal of constructive thought, of the highest value to the State and to the world. I think I have mentioned to you "The Celtic Temperament" and other works of Francis Grierson. In a tribute to Grierson on one occasion Maurice Maeterlinck said he was privileged to "breathe the atmosphere of supreme spiritual aristocracy which emanates from all your work." That is what we want to cultivate. But this rush is dead-against it; and I believe that, great as is the loss in private life, it is infinitely greater in public work, where one man given to a little sober thought is worth a score who rush from meeting to meeting under the delusion that they carry the burden of humanity on their slender shoulders.

SIXTY YEARS AGO.

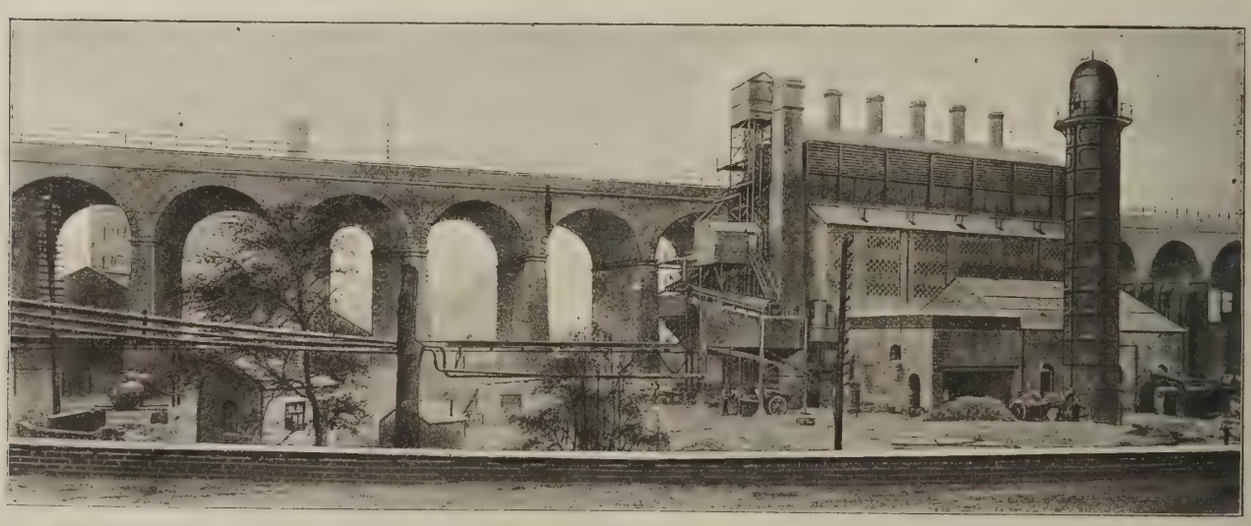
From the "Journal" of July, 1857.

Disposal of Coke.—Now that the question of the price of gas has, with few exceptional cases, been satisfactorily adjusted throughout the length and breadth of the Empire, the question, "What are we to do with our coke?" has become of almost paramount importance to the gas manufacturer. Experience has demonstrated that the demand for coke has not kept pace with the consumption of gas; and, in spite of the active canvassing of shareholders and their friends in their own limited circles, the markets for coke are everywhere glutted to such an extent that, when the stores become filled, the brick and lime burners clear off the surplus on ruinous terms. Numerous expedients have been suggested for the remedy of this state of things; and many of them have been tried with partial and very dubious success. Some of the large producers have sought distant markets in the manufacturing districts, to the manifest injury of the local gas-works. Others have reduced their price to such an extent that, though they may have doubled the quantity sold, the return in money has not much exceeded what it was at the higher rate. Indeed, the consumption for domestic purposes appears to have reached its limit in most places in this country, and to be incapable of any important extension even by material reductions in price. On the other hand, several gas engineers have directed their attention to the perfecting of some system by which the yield of gas from a given quantity of coal can be considerably increased, and the production of coke be thereby diminished; while others have proposed so to improve the quality of the coke itself, as to allow of its being used for locomotives and metallurgic purposes. The patent taken out by Mr. Croll in January last, in which he proposes to introduce a stream of small coal or dust into an inclined retort by means of a self-feeding apparatus, is an example of the former; and, if this system is successfully established, it would diminish by one-third the coke produced in our large gas-works. Our neighbours across the Channel, who are suffering under the same difficulty as the English gas manufacturers, have particularly examined the question of the possibility of collecting the gaseous products of closed and externally heated coke-ovens, and have succeeded in obtaining a coke greatly superior to that made in the ordinary ovens; while the gas, according to the report of M. Regnault, the distinguished chemist, is in no perceptible degree inferior, either in quantity or quality, to that obtained from the same coal by the ordinary process of distillation.

Coal Colliers.—The experiment about to be made in the conveyance of coal by leviathan screw-colliers, is watched with much interest by all consumers of the commodity, and more especially by the Metropolitan Gas Companies, as expectations are held out that half the present rates of freight will be remunerative; and, if this prospect is realized, it will revolutionize the whole gas-making trade of London.

LONGWOOD GAS COMPANY'S NEW WORKS.

There was an interested party of guests last Thursday to inspect the new gas-works which were erected during 1915-16 for the Longwood and Slaithwaite Gas Company. A tour of the works was made by the visitors, under the guidance of Mr. J. H. Brearley (the Engineer), Messrs. J. W. Broadhead and Toogood (of Messrs. R. Dempster & Sons, Ltd.), Mr. Thompson (of Messrs. Drakes Ltd.), and Mr. Oxley (of Messrs. George Waller & Son, Ltd.). During the inspection and by the different speakers at the subsequent luncheon, both the arrangement of the works and the forward policy pursued by the Directors of the Company were favourably commented upon. The troubles that Messrs. R. Dempster & Sons, Ltd., and Messrs. Drakes Ltd., had had to contend with were also fully acknowledged—Mr. Brearley remarking that it was almost a surprise that the work had been completed at all, in view of the difficulties that had had to be faced.

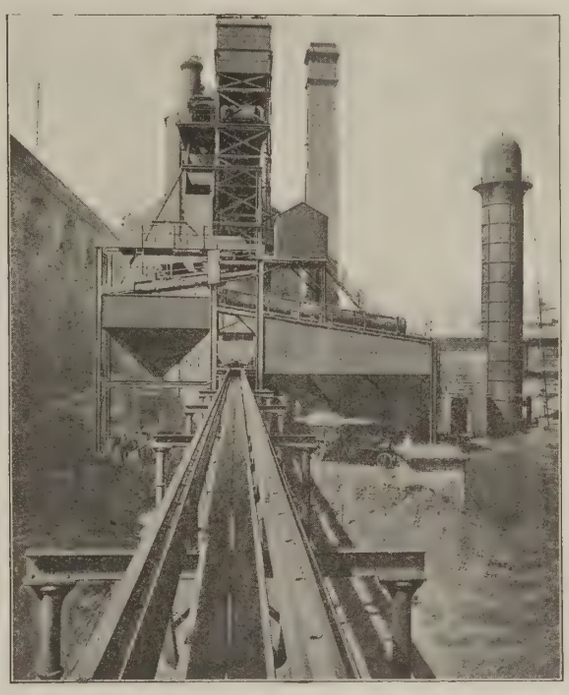


GENERAL VIEW FROM THE OLD GAS-WORKS.

DESCRIPTION OF THE WORKS ERECTED DURING 1915 1916.

The Longwood Gas Company serve a district in which the staple trades are textile, with the manufacture of woollen goods greatly predominating. The local manufacturing firms have all shown great enterprise; and the district supplied has in consequence developed considerably. The quantity of gas sold in the year 1895 was 37,000,000 c.ft. In 1915, the amount of gas sold was 192,000,000 c.ft. In 1916 there was a set-back, which, it is believed, will be but temporary, due to lighting restrictions, &c. The quantity sold in that year was slightly under 177,000,000 c.ft. The growth in output, however, is not entirely attributable to industrial developments, but is also accounted for in part by amalgamation with other gas companies. In 1901, the works of the Colne Valley Gas Company were absorbed, the output from

HOIST AND COKE SCREENING AND STORAGE PLANT.



GABLE END, SHOWING THE 70-FEET HIGH COKE-SCREENING PLANT AND YARD GANTRY.

which was approximately 14,000,000 c.ft. On Jan. 1, 1915, amalgamation with the Slaithwaite Gas Company took effect. The gas sold from these works in the preceding year was 56,000,000 c.ft. About two years before the amalgamation, the Slaithwaite Gas Company had made a very favourable offer of their works to the Slaithwaite Urban District Council; but this was not accepted. Consultations were then held between the Boards of the two Companies; and, owing to the growth in the demand for gas, and the necessity of providing for future requirements by way of extensions, it was concluded that it would be to the advantage of the district to concentrate the supply at a single works, thus affording greater latitude of choice in regard to the economical adoption of mechanical equipment. After visiting several works and inspecting various systems of carbonization, it was ultimately resolved to adopt the "Dempster-Toogood" system of continuous vertical retort carbonization. This is described to-day on pp. 192-5. The remainder of the plant was installed by the following contractors: Boilers, steam and water connections, water-softening plant, gas exhausters (Wallers'), Livesey washer, tower scrubber, rotary washer-scrubber (Holmes), purifiers and house, tar and liquor tanks (underground and overhead), pumps (tar, liquor, and water), yard connections, and foundations for the plant—Drakes, Ltd., of Halifax. Gas-compressors—George Waller & Son, of Stroud. Rotary Meter—Rotary Meter Company, Ltd., of Manchester. Six-in. high-pressure main from Longwood to Slaithwaite, including governors—Nicholson & West, Ltd., of Halifax.

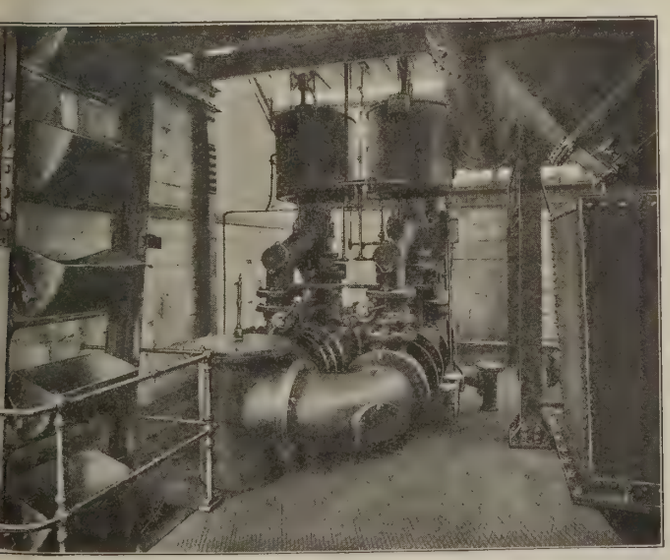
Boilers.—There are two Lancashire boilers, one 28 ft. long × 7 ft. 6 in. diameter, of J. & J. Horsfield's make, and the other 24 ft. long × 7 ft. diameter. Both are fitted with Wilton's patent forced draught breeze furnaces, and work at 100 lbs. steam pressure. The water-pipes are arranged to allow of either boiler being supplied with water by the injector or the feed pump, from the town's supply, or from the water storage tank, as desired.

Water Softening.—The water-softening and purifying plant is of the Wilson patent type, and is arranged so that the water, which is pumped from the beck, is first passed through a roughing filter on to the mixer, where the reagents (which in this case are copperas and soda ash) are added, and then into the overhead storage tank, whence it passes through the final quartz sand filter to the clean water supply tank, from which the feed pump or the injector draws. The plant is capable of passing 1000 gallons per hour, and is so designed that the treatment does not vary, however much the rate of water supply to the plant may fluctuate, as it automatically regulates the amount of reagent to suit the rate of flow through the plant. The filter-beds can be perfectly cleaned without putting the plant out of action.

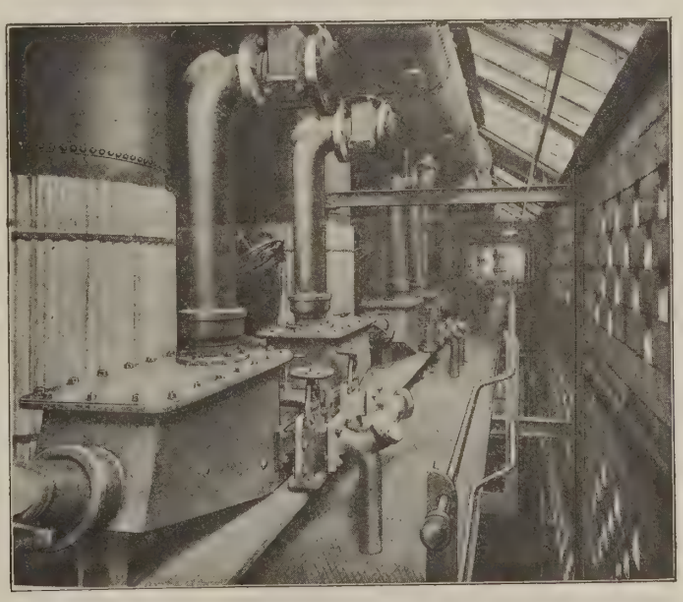
Power-House.—Herein are installed the duplicate generating sets for supplying the electric current for the vertical system and the coal and coke handling plants, steam-driven exhausters in duplicate, steam-driven gas-compressors in duplicate, suction pump for supplying water from the beck to the water-softening plant, boiler feed pump, gas gauges and recorders, and emergency gas-engine and electric generator for use in the event of any stoppage of the steam-raising plant.

Gas-Exhausters.—There are two Waller four-blade Beale type exhausters, each capable of dealing with 50,000 c.ft. of gas per hour at 80 R.P.M. Improved type steam and gas governors are provided; and each set is fitted with a small air-blower for revivification of oxide *in situ*, which is belt-driven from the main shaft, and is capable of dealing with 2½ p.ct. of the nominal capacity of the exhauster.

Gas Compressors.—There are two double-acting reciprocating



TWIN RETORT-HOUSE GOVERNORS AND FITTINGS.



INDEPENDENT HYDRAULIC MAINS AND PLATFORM.

gas-compressors, each capable of dealing with 30,000 c.ft. of gas per hour against a pressure of 10 lbs.

Gas-Engine and Emergency Set.—This consists of a 40 B.H.P. gas-engine and generator. The set was originally installed at the old works; and though it is not quite adaptable as to power to its new work, it forms a very useful emergency set in case of temporary failure of the steam supply. The drive from the gas-engine is through a countershaft, and arranged so that it will drive either exhauster as desired. A very steady vacuum chart is obtained by this method.

Gauges, Recorders, &c.—As far as possible, all gauges, recorders, &c., have been fixed in the power-house; so that they are constantly under the eye of the carbonizing foreman and the boiler and engine men.

Scrubber and Livesey Washer.—The scrubber is 10 ft. diameter and 60 ft. high, of 1,000,000 c.ft. per day capacity, and filled with wood boards. A liquor turbine is installed in the machinery-room on top of the scrubber, together with the usual distributor apparatus for spreading the liquor. In the base of the scrubber there is a Livesey washer, which is arranged with two outlet seal-pipes, so that it may be used either as a tar-extractor in the ordinary way, or as a tar-washer for the extraction of toluol from the gas.

Scrubber-Washer.—The scrubber-washer is of the Holmes improved pattern rotary type. It is of 1,000,000 c.ft. capacity, driven by means of a vertical steam-engine situated between the two sections of the machine; and the drive is through a flexible coupling and worm gear.

Purifiers and House.—This house is 125 ft. long by 50 ft. wide. It is covered with a Belfast roof supported by a steel structure. There are four luteless purifiers, each 30 ft. × 30 ft. × 5 ft. deep, and arranged in line forming one box 120 ft. long × 20 ft. wide. Each purifier has two covers; and these have the usual rubber jointing. The purifiers are fitted with Spencer's hurdle grids. The cover-lifting apparatus consists of a hand-operated Goliath crane, which runs on rails cast on the top purifier plates. The purifiers are fitted with separate inlet and outlet valves of the Holmes double-faced "Western" type.

Underground Tar and Liquor Tank.—This tank is constructed of cast-iron plates built-up to form a tank 30 ft. × 15 ft. × 8 ft. deep, and having a plate to divide it into two compartments. The top is of reinforced concrete, with suitable manholes to give access to the tank.

Overhead Tar and Liquor Tank.—This tank is constructed of cast-iron plates built-up to form a tank 28 ft. × 16 ft. × 5 ft. deep, having a division plate placed two-thirds from one end. It is supported on a steel structure, and is covered with tongued and grooved boarding and tarred felt.

Pumps.—There are two Evans vertical Cornish direct-acting pumps, each having 3-in. connections, so arranged that either pump can be used for circulating the liquor round the scrubber, or for pumping tar and liquor to the overhead tank, or liquor to the sulphate plant, which is on the old works.

Rotary Meter.—The Thorp rotary meter is capable of passing 50,000 c.ft. of gas per hour, and is at present housed in a temporary construction, pending the future building of a new laboratory and meter-house.

High-Pressure Supply to Slaithwaite.—The Slaithwaite holders are supplied with gas direct from the Longwood new works. The holders are filled-up at stated times under high pressure, from the reciprocating compressors, through a 6 in. steel main. The 6-in. high-pressure steel main is 5340 yards long, with socket joints acetylene welded. It is divided into five sections by Donkin high-pressure gas-valves. Seven syphons were necessary, on account of the varying altitude. At the lowest point midway between Longwood and Slaithwaite a duplicate set of Reynolds 2½ in. district governors is fixed, to boost the existing 6 in. low-pressure main. There is also in the same governor-pit one 6-in. Donkin combined high and low pressure valve, for augmenting the pressure in the 6-in. low-pressure main when the compressor is not working. The governor-house at Slaithwaite contains a duplicate set of 6-in. Reynolds governors for an outlet pressure of 6-in. water-gauge, and connected to a 12-in. holder valve at the inlet of the holder (both by Donkin), which is automatically closed when the holder is full. The steel main was tested to 100 lbs. per sq. in. pressure, and found quite sound. Not a single length of main had to be cut out or a single joint re-made.

The whole of the gas lighting installation and plumbing work was done by the Company's own workmen. Owing to the war certain work has been unavoidably left over.

DEMPSTER-TOOGOOD CONTINUOUS VERTICAL SYSTEM.

Description of the New Carbonizing Installation at Longwood.

In connection with the formal opening which took place last Thursday, as recorded above, of the new gas-works of the Longwood and Slaithwaite Gas Company—of which Mr. J. H. Brearley is the Engineer—the following description was prepared by Messrs. Robert Dempster & Sons, Ltd., of Elland, of the installation of the Dempster-Toogood system of continuous vertical retort carbonization. The contract was given out in February, 1915. Messrs. Dempster & Sons commenced work on the site the following June; and gas making was achieved in December, 1916. The complete works have thus been built under all the disadvantages of war conditions.

The new site of 3 acres is adjacent to the old Longwood works; being separated only by the main public road and a brook. The characteristic features presented by the site are: The main line of the London and North Western Railway is carried along one side of the site on a monumental stone viaduct, 65 ft. high; yet no siding to the site was financially practicable. The site falls some 20 ft. towards the brook; and a public road is situate at both the high and low levels. The district coal sidings (the railway being above the valley) are at the high-level end. Hence, naturally, the coal arrives by carts at the high-level road. The low-level main road better serves the district. Hence it is the more suitable for coke distribution and general gas-works services. Therefore, the site containing no complications to tie the hands of the Engineer, peculiar interest attaches, not only to the type of plant installed, but to the cohesion, or method of application for the best utilization of the essentials of the site.

Carbonization.—This, the most important factor of gas manufacture, in a broad sense and as a working whole, embraces everything from the receipt of the coal to the delivery of the residual coke. To accomplish the desired ends, the carbonizing plant is arranged in one continuous line, 400 ft. long; the coal arriving at the high-level, being tipped from the elevated position in the cheapest manner possible, and without the aid of machinery. The thrust of coal in the store is taken by the earth-work of the cutting. The residual coke arrives at the other end for distributing, *viâ* the low-level roadway to the district.

Coal Handling.—A gravity bucket conveyor circumscribes the breaker-pit, the coal-store, the retort-house, and the coke screening and storing plant; the lower strand receiving material, and the top strand delivering material, at any desired point throughout its length. Thus, whenever coal arrives, it is broken and sent (1) direct to storage hoppers, 48 hours' capacity, 200 tons untrimmed; (2) direct to the coal-store, 10 days' supply, 1000 tons untrimmed; (3) the lower strand automatically, and without expenditure of extra labour, replenishes the hoppers from the store, hence the 1000 tons of coal in stock is on tap for gasmaking. Railway arches are used for supplementary coal storage.

Coke Handling.—The residual coke, having equal bulk with the original coal, should, for similar economy of working, have equivalent facilities of handling. This is accomplished by the same gravity bucket conveyor, as by means of a travelling feed and filler the coke is gently handled (1) direct from the retorts to coke-storage hoppers over the retorts and furnaces, of 50 tons capacity, or (2) direct from the retorts to the coke screening plant, of 57 tons capacity.

Coal Breaking and Handling Plant, 40 Tons per Hour.—The coal arriving at the works for current use is dumped into an underground receiving hopper. From the hopper, the coal is extracted by a reciprocating tray, which regulates the rate of flow regardless of the grade of coal, thereby preventing chokes. From the extractor, the coal passes over a screen, the lumps going to a four-roll breaker of massive construction. The breaker is belt driven; so that the belt slips should the breaker be jambed with foreign material inadvertently delivered among the coal. The nuts and slack bye-pass the breaker. The whole coal thus prepared enters a rotary filler, the function of which is to load each bucket axially, so as to gravitate plumb without spilling. The loaded buckets are discharged at desired points by cams fixed to the framework in the usual manner.

Gravity Bucket Conveyor.—This contains 272 buckets at 2 ft. pitch. The chain links are 2 ft. centres of hinge-pins—viz., twice the normal length. Thus the knuckle-joints are halved in number with consequent reduction in wear and tear and stretch of chain and it facilitates lubrication. Each link is fitted with hardened steel renewable bushes; and the knuckle-joints are automatically lubricated. To overcome the pulsating strains being transmitted to the chains by the hexagonal driving sprockets (Dempster and Toogood's patent), eccentric spur-gearing pinions are employed which give to the links a very steady motion. The lower strand is provided with a travelling rotary feed and filler [Patent No. 102,535 of 1916]. This machine can be anchored by brake gear at any point to receive, regulate, and axially load coal or coke into each bucket without spilling or choking. The conveyor-trough is rendered self-cleaning by a special pushplate attached to the links, which deposits the material in a sump, from which it is easily and periodically removed.

Coal-Store.—This contains 1000 tons of broken coal. If trimming be resorted to, the capacity could readily be increased to 1250 tons. The coal is handled to and from the stores in a very automatic manner by the conveyor. The coal-store is partially cut into the hill side, whereby the thrust of coal is largely taken by the earthwork. The building is of steel structure 95 ft. long × 36 ft. span; the structure being filled with concrete blockwork, 4½ in. thick, offering a rock-faced exterior to harmonize with the general tone of the buildings in the locality, and a smooth interior. The floor of the store has been excavated to the general yard level, to facilitate general usefulness.

The lower strand of the gravity bucket conveyor throughout the length of the coal-store is covered with an archway of interesting construction. The roof consists of continuous slide-doors operated from the underside. The sides are formed of planks placed Venetian blind fashion. The heart of the coal in stock is thus always under observation; and the planks being readily removable, the maximum facilities are at hand for emptying every ton of coal in the most economical manner.

Retort-House.—This building presents a massive stone exterior, though similarly constructed to the coal-store. Its dimensions are 90 ft. long × 36 ft. span × 75 ft. total height. The roofs are slated, except for the portion adjacent to the bench top, which is wholly glazed and provided with hinged portions, whereby the bench top is well lighted and ventilated.

Foundations.—The subsoils were of good character, though, being at a rapid inclination towards the river, caution was necessary for so important a structure. Accordingly, a ferro-concrete raft was introduced under the bench, to spread the superincumbent weight, so that the subsoil is not loaded to a greater extent than 2 tons per super foot.

GENERATOR HOUSE, SHOWING GAS COMPRESSORS AND EXHAUSTERS.

Vertical Retort Installation—Dempster-Toogood Process.

The characteristic dominating the design of this system is the balanced independence of each retort or unit.

Bench.—The bench contains twenty retorts, of a total capacity of 1,250,000 c.ft. per diem. The retorts are grouped in five beds. Each bed is heated by a stepped producer of large grate area. Each producer is provided with a controlled stream of pre-heated, saturated primary air, and has an independent chimney. Advantage is taken of the elevated position of the ashpan to furnish at each ashpan a storage hopper, so that the ashes raked from the ashpan are stored, pending periodic removal at ground level. The producer burns at a constant depth of fuel, thus facilitating the maintenance of a uniform quantity and quality of producer gas. The producer gas flue from the furnace is formed as a "whirl," whereby mechanically suspended flue dust particles are precipitated, before entering the combustion chambers. Thus their fluxing proclivities are prevented. The producer gas enters the setting by twin flues, such that either one can be damped-off and two retorts worked independently.

Bench Bracing.—The bench is very rigidly braced by plate girders, lying horizontally and stiffened by vertical handrails, thereby forming walking-ways surrounding the bench.

Staircase.—A steel staircase gives access to all levels, and extends in easy flights from the ground level to the top strand of the conveyor, 70 ft. above the ground, so that the greatest facility exists for supervision.

Retorts.—Each retort is built-up, together with its flues, from grooved and tongued bricks of highly refractory material, to an accelerated taper, in accordance with Patent No. 16,471 of 1912. The total height is 25 ft., and the maximum section 5 ft. × 1 ft. 8 in. In action, each retort contains 2 tons of material under distillation. In fact, these retorts possess the throughput of a coke-oven; yet the charge is never handled in bulk. Each retort is a unit of heating, and is controlled by one damper; the method of heating being the ignition of producer gas in eight flues at one level situate some distance from the top of the retort. The flames of combustion, being shaped by annular burners, burn downwards in vertical flues. Thus impinging and cutting actions are totally obviated. Further, the vertical flues having no floors in the combustion zone, the dust particles fall freely to the cooler parts of the setting. Their tendencies to flux are thus rendered dormant. The products of combustion in the eight flues travel downwards, giving off their heat to the charge in a perfectly systematic manner; and at the base the whole of the low-temperature products collect, and rise to co-mingle round the top of the retort, to regenerate on the incoming cold coal, and to heat efficiently the twin free spaces above the cap of the charge wherein the vapours are selectively cracked into gas.

Retort-House Governors.—These are grouped on the bench top, where they can be readily seen and attended to. They are in duplicate of 8 in. size, so that one spares the other. Each stands on a seal-pot, so that sediment can be removed; and the whole installation is fitted with gauges, thermometers, &c.

Behaviour of the Charge in the Retort.—Each cross-section expands on heating; but as the motion downwards is continuous, each horizontal cross-section of the charge meets an ever-increasing cross sectional area of the retort in order to accommodate, and in proportion to, such expansion, without giving undue thrust. In this system, this increase in area is maintained throughout the whole retort and cooling chamber in [accordance with Patent No. 17,616, of 1912], until, in fact, the maximum cross-section of the charge rests on the moving coke-extractor gear. Thus, at the bottom, the cooling coke contracts, fissures form naturally, and the heat is better conducted to the cooling mediums. The cooling chamber is of tubular construction; the lower two tubes (to absorb the low temperature) being of iron.

The whole of the primary air and water vapour for the furnace circulates in the lowest tube. The secondary air, controlled for each side of each retort by extra fine slit adjustable slides, is heated in the upper tubes by the spent coke of its particular retort, and rises direct to its allotted place at the burners. There being no regenerators in the ordinarily accepted sense, there is no risk of short-circuiting. The outcome of this patented method is a straightforward setting, easy of understanding, and easy of control.

Gas Egress from the Charge.—To start the charge on its way in the best manner possible, the coal enters on the centre of the major axis. The larger pieces gravitate to each side, establishing at the outset a balanced condition of the charge, and forming

two free spaces, so that the evolved gas rises with equal resistance through each half of the retort. Coal and coke are admitted to the retort through a gas-tight coal-valve, the faces of which are vertical, and the plug of which is completely rotative. Hence the faces are all self-cleaning. Each retort is provided with its own hydraulic main and appurtenances; so the carbonizer can work each retort independently, according as experience dictates.

Cooled Bench Top.—The top retort mountings are grouped right and left hand, so as to form a large clear working space on each bed. The bench is paved with tubular fire-brick, and the chimneys lagged with vented asbestos. An induced current of air traverses the whole, so that the stoker, having relatively greater space of movement, has freedom which conduces to efficient working.

Liquor Circulating.—High and low level tanks are provided. A small steam-pump, running very slowly, keeps the top tank replenished. The liquor gravitates back through all the mains to the lower tank, so that any crystals are immediately dissolved before they can become protected with a coat of tar. This is one reason for the remarkable freedom from chokes. The surplus liquor and tar overflow from the lower tank to the well.

Condensers.—There are five atmospheric annular condensers, 30 ft. high, 48 in. external diameter, and 39 in. internal diameter, and one water-tube condenser of similar external dimensions, fitted with 63 tubes. The condensates are removed by 4 in. branches and a 6 in. main terminating in a seal-pot. There are 18 in. bye-pass and rack-valves fitted, for bye-passing as and when required.

Cooled Coke-Extractor Gear.—The most important function of continuous carbonization is the removal of the coke in such a manner that the charge moves downwards uniformly over the whole cross-section of the charge. In this system, it is interesting to note, the design contains no claws, arms, or worms, but instead the friction engendered by the force of gravity alone is utilized. In this way: (1) Breakage of coke is reduced to the minimum; (2) every conceivable horizontal cross-section of the charge in turn descends through an ever-tapering retort to be uniformly extracted by the mechanism; (3) the two-fold motion imparted to the extractor absolutely overcomes the tendency of the coke to bridge or hang-up.

The extractor consists simply of an inclined tray, on which the cooled coke rests at the natural angle of repose for coke. Slow reciprocating motion is imparted, so that in one direction the coke rolls gently down the angle of repose, and in the reverse direction the charge gravitates bodily and uniformly down the retort to fill the vacant space formed. The slight agitation of the reciprocation prevents all bridging of the coke.

The extracted coke is collected in receptacles, which are discharged to the conveyor at two-hour periods. Each receptacle is fitted with a controlled steam supply for the double purpose of (1) damping any sudden contact of gas and air on the opening of the self-sealing lids, and (2) permitting a percentage of blue water gas to be economically made by steaming the charge to a desirable extent.

Adjustable Drive to Extractors.—The extractors are driven by absolutely silent friction ratchets, and are capable of the widest possible and independent adjustment for each retort. All adjustments can be made without stopping; the normal working being a 4½ in. stroke of tray in 4½ minutes.

Coke Screening and Storage Plant.—With continuous vertical retorts—the buildings being of necessity high—there is a surfeit of height at disposal in the design of a coke-screening and storage plant. This feature, peculiar to vertical carbonization, has been fully developed at Longwood to give (1) large storage hoppers above and below the screens, (2) to adopt superimposed rotary screens at the best inclination, and (3) to give extra cartage room for the accommodation of modern motor vehicles.

The coke arrives direct from the retorts (*viâ* the gravity bucket conveyor or hoist) at a height of 70 ft. above the ground, and is delivered to a receiving hopper built as an inclined silo, so as to reduce breakage of coke to the minimum. Its capacity is 10 tons. Hence it acts as a reservoir of unscreened coke, thereby saving the necessity of running the screening plant during periods of stoking—facilitating the disposition of labour. Beneath the silo is fixed reciprocating extractor gear, which delivers the coke either to the coke-cutter for reduction in size, or direct to the screens (in a regulated quantity), whereby chokes are prevented and better screening ensured.

Continuous vertical retort coke being relatively dry, rotary screens are very suitable; and there being no embargo on head-room, two superimposed screens are permissible. The maximum percentage—viz., the large coke—is taken out at the first operation by one screen; only the tailings of lesser bulk passing through the other screen, by which means more efficient screening and less wear and tear are established. Beneath the screens, storage hoppers containing 15 tons of large coke, 10 tons of small coke, 12 tons of smithy coke, and 10 tons of broken coke are grouped—sufficient head-room being left for the ready use of modern heavy motor vehicles. In this way, the combined storage capacity is 57 tons, representing a 24 hours' winter sale, or a 48 hours' summer-time sale—a capacity commanding convenience of working with efficiency of yard labour.

Auxiliary Handling and Yard Storage Plant.—To act as a spare plant to the gravity bucket conveyor, give ready access to all parts (additionally to the main staircase), and provide means for economically dealing with the surplus coke in the yard, a high-speed electric hoist, a special ball-bearing truck, and necessary gantries are provided. The hoist is capable of raising two tons at 100 ft. per minute, and follows the generally accepted lines of electric hoist construction. It is fitted with the usual complement of safety devices and safeguards. The cage is commodious, being 9 ft. × 7 ft. 6 in. × 7 ft. 6 in. high, and is fitted with automatic grip catches to arrest and lock the truck within the cage.

The hoist structure is 88 ft. high, and exit levels and safety gates are situate: At ground level, giving access to retort-house and coke stack; at heights of 15 ft. 6 in., giving access to the clinker floor and yard gantries; at 38 ft., giving access to the bench top and screening plant; and at 63 ft. above ground, giving access to the coal-storage hoppers and the silo over the coke-screening plant.

The truck is mounted on ball-bearings, and is surprisingly easy of manipulation. It contains approximately one ton of coke; and as one man could not tip such a load in the orthodox manner, side discharge doors are fitted, locked and manipulated by Dempster's single-pull lever gear from either end of the truck. The gross load of the coke and truck is some 38 cwt.; and as the full truck passes always in one direction, the several gantries are slightly inclined, so that the full truck practically gravitates to the discharging positions.

TOWER SCRUBBER, ROTARY SCRUBBER-WASHER, CONDENSERS, &c.

To enable the attendant to manipulate such a heavy load to and from the cage, it is necessary that the rails should be in exact alignment. To get the desired exactitude without a series of trials and starting and stopping of motors, all landings are fitted with a trip gear of Dempster's design, such that the rails are always held in alignment even should the hoist cage come to rest at any position within a margin of 3 in. of its correct position. Thus the stoker's work is simplified and wear and tear reduced.

The yard gantry is 160 ft. long and 15 ft. 6 in. high; consequently 500 tons of coke can with ease and dispatch be taken to the yard and stored without excessive breakage. Inclined rails are laid beneath the gantry at yard level, so as to facilitate bringing coke from the yard to the screening plant *viâ* the hoist. An inclined gantry is arranged under the retorts and over the storage hoppers; thus permitting coke to be handled *viâ* the hoist direct from the retorts to the storage hoppers and coke-screening plant.

The hoist is kept 10 ft. from the retort-house, and a 9-ft. cartway is left between the boiler chimney and the hoist. This is by design; so that, when the yard is complete, a 2-ft. gauge track will be laid through to the coal-stores and into the yard, and connected to the hoist—thus permitting coal to be handled from the store *viâ* the

hoist, and ashes from the ash-pan *viâ* the hoist, and, if the need arises, to stack and handle hundreds of tons of coal to and from a stack in the yard in an economical manner.

Power-House, Boiler-House, and Mess-Room.—The buildings are of 9 in. concrete block work; the exterior representing a stone façade, such that the buildings harmonize with the locality. The roofs of the power-house and mess room are boarded and slated, and provided with a glazed sky-light. The boiler-house roof is formed by a cast-iron tank, 40 ft. × 23 × 3 ft. deep, supported on rolled steel joists, and containing the feed water and condensing batteries for the exhaust steam. The interior of the power-house and mess-room is neatly plastered and tiled, to give a light, airy, and pleasing appearance.

Generating Plant.—This consists of two 50 H.P. 600 R.P.M. duplicate direct-coupled vertical steam-driven electric generator sets; steam being supplied at 100 lbs. pressure. The generators each develop 33 KW. at 220 volts direct current. The switchboard is of enamelled slate, and is arranged so that the generator may be run in parallel if desired. The switchboard is prepared for five circuits—viz.: For the 20-H.P. motor driving the coal-breaker; the 20-H.P. motor driving the gravity-bucket conveyor; the 12-H.P. motor driving the coke-screens; the 12-H.P. motor driving the hoist; and the 6-H.P. motor driving the coke-extracting mechanism. Thus there are three sizes—two of each size of machine—thereby facilitating stand-by in emergency and reducing the stock of spares necessary for maintenance.

The exhaust steam from the engines is collected in cast-iron piping beneath the floor; a battery of pipes being formed in the feed-water tank, so as to condense the steam as much as possible, which condensation, in conjunction with the oil separator, recovers much of the oil from the steam for general lubrication purposes. In addition to the electric power, a small gas-engine is installed as a spare to drive the coke-extractor mechanism; so that, even should the steam supply or electric current totally fail, gas making can continue uninterruptedly till all the coal is used from the 48 hours' storage hoppers over the retorts.

Ferro-Concrete Bridge.—To give entrance to the works from the low-level road for the general use and cartage of coke, a ferro-concrete bridge, 34 ft. long and 20 ft. wide, has been installed. This bridge harmonizes with the local stone, and gives the readiest access between the district and gas-works for vehicular traffic.

Drying and Smoking Meat by Gas.

The fruit and vegetable preservation campaign now being conducted under the auspices of the National Commercial Gas Association of the United States has already been noticed; and further attention is drawn to the subject in a recent issue of the "American Gas Engineering Journal" by Mr. Gilbert C. Shadwell, who describes the important part played by gas in the canning, drying, dehydrating, desiccating, chemical preservation, cooking, heating, smoking, refrigerating, extracting, and concentrating of foodstuffs. In this connection, one of the first things to be remembered is that at 212° Fahr. all living cells perish; but some bacteria spores may survive for as long as two or even three hours. Still, few fully developed bacteria can live beyond 165° Fahr. when in the damp or liquid state, or beyond 280° to 290° Fahr. when in dry heat. As to the drying and smoking of meats, a smoke-house is illustrated which is so designed that the smoke may be sent through the meats or deflected into the flue at will, so that food may be left hanging without getting more smoke than necessary; and no smoke escapes into the room when the door is opened. The method of operating the smoke-shutters to secure this, is ingenious. The smoke-generating compartment contains the necessary sawdust pan and the gas-burners—the latter so designed as to give no smoke with a high heat, a heavy smoke with a low heat, or any stage between these two extremes. This is accomplished by having four burners; two under the pan and two at the sides. It is remarked that cured meats, after being soaked to remove surplus salt, should hang several hours. Then the smoke-house should be warmed to about 115° Fahr., so as to dry the surface of the meats. For this purpose the outer burners may be used, as they do not heat the sawdust pan. When thorough drying is accomplished, the burners under the sawdust pan [hardwood sawdust being used] should be lighted, and the temperature be allowed to rise gradually to 118° Fahr. in ten or twelve hours. The meats should be allowed to cool-off with the ventilator open before removal from the house. Of course, varying treatment is required for some meats.

"The Trade of To-morrow."—This is the title of a small book by Mr. Ernest J. P. Benn, receipt of a copy of which we have to acknowledge. The publishers are Messrs. Jarrold & Sons, Ltd.; and the price is 2s. 6d. net. It deals with a subject to which the author (as he has previously shown, in a book issued some time ago) has devoted a great deal of thought and study. In the introductory chapter, there is outlined a system of statutory Trade Councils working under a Minister of Commerce, which seems to Mr. Benn to offer a solution of most of our industrial problems; and after indicating the need for these bodies, and pointing out a few of the many fields which are open to their activities, he sets out the recommendations in greater detail. The claims which the author makes for the scheme—in principle, at any rate—entitle it to consideration. To quote only one of these claims, the scheme "puts the politician, the official, and the business man each in his proper sphere."

FUEL ECONOMY.

By E. W. Smith, of Birmingham.

[Earlier this year, there was a discussion before the Birmingham Section of the Institution of Electrical Engineers on the subject of "Low-Temperature Carbonization." Mr. Drummond Paton and Mr. Frith, both of Manchester, presented papers; and Mr. E. W. Smith, the Chief Chemist to the Birmingham Corporation Gas Department, was asked to contribute to the discussion, and furnish matter for publication. The Institution have now decided not to publish the papers or the discussion; but "Journal" readers will be interested in Mr. Smith's remarks, which he has been good enough to forward. In reproducing them, it may be stated that the discussion at the meeting referred to went very strongly against the use of raw fuel for the production of electricity.]

As regards low-temperature carbonization, I have an entirely open mind. I can see many objections to it as compared with present methods, and so far few advantages if it is proposed to displace the present methods of carbonization by the new ones. One is impressed by the enthusiasm of Mr. Drummond Paton on the subject of his paper; and his hearers admire his boldness in coming before a Society of an industry which is one of the greatest delinquents in the wastage of coal. There has been much talk during recent times on this all-important subject; and while two Professors [Bone and Armstrong] have been talking, the men with sound practical experience have been working. This work, however, must be more general.

One cannot understand why Mr. Paton and his friends still cling to the use of solid fuel for domestic purposes. Surely they must recognize that, taking everything into account, gaseous fuel has proved the most efficient. The wish to centralize power stations near the pits, and so reduce freight, appears to be largely a delusion—a snare. When applied in conjunction with the process of low-temperature carbonization, the solid fuel produced will amount to over 75 p.ct. of the original coal. It will occupy a space more than that of the original coal; and wagon hire will be increased correspondingly. It is surely wasteful to leave in the solid residue at least 10 p.ct. of volatile matter, or between 30 and 40 p.ct. of what was originally available in the coal.

Great claims are made for the yields of tar; but while the speculator may be satisfied with the increased yields shown, the technologist and engineer require figures indicating the constitution of these tars, as compared with coal tar, and their commercial value after full trials. The process of low temperature is, however, wasteful in gaseous fuel and ammonia. About 5500 c.ft. of gas is obtained, of a total heating value of 750 B.Th.U. per cubic foot, or an available quantity of heat in the form of gaseous fuel of 4,125,000 B.Th.U. per ton of coal. Gas-works practice (high-temperature carbonization) would give 12,000 c.ft. of gas of 550 B.Th.U. gross, or an available quantity of heat in the form of gaseous fuel of 6,600,000 B.Th.U.—an increase of 60 p.ct. The suggestion that the rich gas might be diluted with (say) blue water gas is not a very practicable one, and would certainly not cost any less, unless the gas were evaluated according to coke-oven methods. From low-temperature carbonization the yield of ammonia per ton of coal corresponds to 20 lbs. of sulphate, as compared with 28 lbs. from gas-works practice; and if the coke be gasified in Mond producers, a further yield of 33 lbs. may easily be obtained, or a total of 61 lbs. from the original coal, as compared with 20 lbs.

The volume of town gas sold in Birmingham for the year ended Dec. 31, 1916, amounted to 10,733,000,000 c.ft., of which 14 p.ct. was used in gas-engines, 19 p.ct. for industrial heating, and about 27 p.ct. for gas fires and cookers; giving a total of over 60 p.ct. for heating and power purposes. This total gas corresponds to about 720,000 tons of coal, from which, besides the gas, there has been obtained about 9 million gallons of tar, 475,000 tons of coke, which is used for boilers, furnaces, and metallurgical purposes, besides the large quantities employed in the production of water gas and producer gas from which bye-products are obtained.

Do not think from what I have said that I wish to give the impression that there is no room for electricity. Gas-works are large users of electricity. In the Birmingham Gas-Works we use over 200,000 units per month, most of which is generated on our own works at a substantially lower cost than we can buy it. As an industry, we are proud to think that, in principle, our methods for the utilization of coal have so far proved the most efficient. Not only are we the purveyors of energy, but our works are also chemical works on a large scale. I am of opinion that too much can be made of the idea of the centralization of power production. I believe it is generally felt that when a gas-works has reached a capacity of 20 millions a day, it is better not to extend further, but to build new works—the mains being interconnected.

Illuminating Engineering Society of America.—In connection with the "Correspondence Convention" of the Society (which, as already announced, it is intended to hold this year in place of the usual annual convention), a tentative programme has now been arranged. This includes the Presidential Address of Mr. W. J. Serrill. The idea is to arrange the papers in groups, and to invite written discussion from those who apply for copies. The papers may also later on be utilized for sectional meetings.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the Longwood Gas-Works.

The formal opening of the new works of the Longwood and Slaithwaite Gas Company, near Huddersfield, last Thursday, in the presence of a large gathering of senior gas engineers, was followed, on Saturday afternoon, by a visit of the members of the Yorkshire Junior Gas Association, under the presidency of Mr. J. E. Lister Cooper.

The weather was brilliantly fine, and the visitors were able to inspect the various installations (described here and elsewhere in the "JOURNAL") in every comfort.

The guests were received by Mr. J. H. Brearley, the Engineer and Manager of the Company, on behalf of the Directors. Mr. Brearley said he was glad to welcome the Juniors to Longwood. It was about the third time the Association had asked to be allowed to see the reconstruction of plant; but he had felt that if they had come during the process of erection, they would have found the place in a dreadful state. The Company had, therefore, thought it better to have the works in something like a more finished condition before receiving visitors. It was about fourteen years since last the Yorkshire Juniors went round the Longwood works; and then it was not as an Association, but rather as students of Mr. Cranfield, who was, they might all agree, practically the father of the Association. He (Mr. Brearley) believed it was in the very board room in which they were now met that the seeds of the Yorkshire Junior Association were planted, when he had suggested that it would be a good thing if an association of the juniors could be formed. The suggestion had been taken up very heartily by the students; and he believed that was the birth of the Association. He had always taken a keen interest in the doings of the Association. Many of those present might recollect an occasion on which he had read before the Association a paper on "Naphthalene." This paper had been read from the point of view of a man who had had practically no previous experience of the trouble. In all his seven or eight years with the Company previous to the delivery of that paper he had seen no naphthalene on the works. He had seen plenty since, especially since the war. The Company were hoping that the installation of vertical retorts would cause all this trouble to disappear.

The guests were then divided into separate parties, under the guidance of Mr. Brearley, Mr. H. J. Toogood (of Messrs. Robert Dempster & Sons, Ltd., the Contractors for the vertical installation), Mr. M. T. Thompson (of Messrs. Drakes, Ltd, the Contractors for various other parts of the plant), Mr. T. Dyson, Mr. R. H. Duxbury, Mr. Brearley's works assistant, and Mr. E. L. Ongleton, the Company's Sales Manager.

TEA, AND SOME SPEECHES.

After an interesting tour of the whole of the new plant, the visitors were entertained to a substantial tea in the well-equipped rooms of the Armitage Lodge.

The PRESIDENT of the Association, in moving a hearty vote of thanks to the Directors of the Company, to Mr. Brearley, and to the gentlemen who had acted as guides, remarked that the visit was the last of the session, and had been a most valuable one. The gas industry was fortunate in having such progressive men as Mr. Brearley in its ranks; and it was well for the industry that a plant like that at Longwood could be put up and completed under all the difficulties of the present time. He believed all members present must, in the course of the inspection of the works, have learned much of value to themselves in their own particular departments of the industry. The plant was remarkably well thought-out, both in general and in detail. The Association were very fortunate in being able to count upon the support and ready help of Mr. Brearley and other gentlemen of his standing, and might look forward to great possibilities in the near future. The Junior Gas Associations of the country were embarking upon the collection of retort-house data; and no doubt the Yorkshire Association would be asking Mr. Brearley for facilities for the collection of data from his plant. Needless to say, they looked forward with confidence to securing valuable help in their work.

Mr. A. EDWARDS (Leeds), in seconding the proposition, said it had often struck him that they learned most really from visits to the smaller works rather than to those large concerns in which a multiplicity of things are to be found. The plant they had seen that day was neat in every way.

Mr. ED. GARSED (the Vice-President), supporting the motion, said reference had been made to the most obliging assistance and ready help which had always been forthcoming from Mr. Brearley. Another thing which had struck him in going round the works had been the frankness of explanation and confession of troubles. Had there been more time, he felt they could have occupied the whole day in asking questions and getting candid and informative replies. He mentioned this frankness particularly, because it was pretty well known that up to recently the question of vertical retort carbonization had been rather shrouded, and the difficulties met with had been somewhat kept under. He thought some greater frankness would be the means of getting over many of these difficulties and making into an established fact the vertical retort carbonization idea. When one got into a bit of a fix with verticals—and especially in this hot weather, when one had to spend hours in the pitch and tar—one was inclined to complain; but he was convinced that it was by frankness and openness one to another that the difficulties met with in each individual plant could be minimized, and the rough paths made smooth. This frankness would be most essential to the successful collection of data.

Mr. BREARLEY, in responding, expressed his appreciation of the presence of the Association. It was always a delight to him to help forward the work of technical associations; and although there might be men who were able to help the Junior Associations more capably and heartily than he, he could assure the gathering that none could help with greater sincerity. It was, as he had previously remarked, fourteen years since the Association was formed. The other day he came across a letter from the Association's first Secretary, Mr. Fred Schofield, dated May 15, 1903, intimating the successful establishment of the Association, and enclosing a copy of the proposed rules. Later, in November of the same year, he got another letter to say, "We are electing a number of honorary members, and, of course, you are included in the list." These two letters he prized very much. Some of his own junior officials had joined the newly-formed Association, and to-day they had a good many of his officials, whom he appreciated and prized very highly indeed. He hoped the time would never come when he was not prepared to do all he could to further the Association in its work. He must apologize for not having attended the Association's proceedings as often as he would like. Honestly, he was not greatly fond of attending technical gatherings at the week-end after a week's hard work. He was glad Mr. Cooper, Mr. Edwardes, and Mr. Garsed had been able to join the company that day. They were gentlemen who were a credit to the Association. He could assure all present that if there was anything anybody had not got to know that day concerning the Longwood works which he might like to know, all he had to do was to call and look round any day. He need not wait for a formal invitation. Coming from the general to the particular, he understood they were going to compile some data with regard to retort-house practice." So far as he himself was concerned, he would not have much to say about verticals until he had worked them for at least two years. He thought it was a great mistake to rush into print eulogizing or condemning any system before it had been properly tested in the furnace of practice. When he considered the time was opportune, the Yorkshire Association would get to know what he thought of the vertical system. He quite agreed with Mr. Garsed in regard to some things having been kept in the background. Difficulties were always made to be overcome. They at Longwood had had many difficulties already; but they were being reduced to a considerable degree. The difficulty of the hanging-up of verticals was one. But he believed they had now got over it. He thought the solution was largely one of coal selection; but more still one of the men on the work and those who were in charge of the men having a thorough understanding of the proper adjustment of the mechanism operating the retorts. One point which he was not yet quite satisfied about was as to the fuel consumption; but he believed they would be able to arrive at a fuel figure quite as satisfactory as any figure from horizontals. They could not jump into perfection in a week or a month with a new system. If they changed their methods, they had to begin to learn gas engineering over again. There was no comparison between the duties of the men or the supervision when they changed-over from hand-charged horizontals to mechanically charged vertical retorts. He felt that the Longwood Company were entitled to great congratulations on having been able to finish the work during the war conditions. The contractors had faced their undertaking nobly, and great credit was due to them all. They had given the Company an installation which was second to none of its particular type. He was quite confident, from the independent views they had had on Thursday, when the members of the Senior Association were present, and from his own experience up to date, that the Company had got works which were going to be very successful. They had, of course, met difficulties, particularly of a physical nature as well as mechanical; but they were all there to be overcome. Such paragraphs as had recently appeared in one journal, to the effect that vertical installations were failures, &c., were merely "twaddle," and must be written by someone who had never tried them. He took the vote of thanks as a compliment, not so much to himself, as to Mr. Ongleton, a member of the Association's own Council, and the other members of his staff. He was a firm believer in the policy of letting his departmental officials have their own share of responsibility, and giving them every scope to exercise their own discretion and intelligence. He tried not to interfere in their duties, though, of course, in the larger issues they consulted him. So far as the Sales Department was concerned, he left it very much in the hands of Mr. Ongleton. The vertical retort installation was left largely in the hands of Mr. Duxbury; and he could not sit down without adding his mead of praise to Mr. Dyson, who had been most self-sacrificing during these times of difficulty. His officials were a source of great comfort and help to him. In conclusion, he emphasized the invitation to the members to come over to Longwood at any time to get to know anything they thought they might learn further about the vertical retorts, or anything else in which the Company and their staff might be able to give any help.

Mr. H. J. TOOGOOD (Messrs. Robert Dempster & Sons, Ltd,) said it had been a great personal pleasure to him to be present that afternoon; and he thanked Mr. Brearley for having invited him. During the war a lot had been said about difficulties. Truly they were great, especially eighteen months ago, when contractors were buying-up steel. It would be worse to-day, so far as buying steel was concerned, if they had the plant to start, though with the priority numbers, &c., work ought to proceed better than eighteen months ago, and in many ways did so. The action of the Government Departments to-day in relation to carbonizing left the gas industry rather unfairly treated. They saw all over the country their great competitor, electricity, putting down machinery with practically no difficulty. The electrical people were able to get priority numbers very readily; while gas undertakings could hardly get facilities even for necessary repairs. Wherever one went, one found the coke-oven plants getting preference. When the war was over the gas industry would have great competitors in the electric and coke-oven industries; and it was for associations such as theirs to keep a close watch on the welfare of their own industry.

Mr. M. T. THOMPSON (Messrs. Drakes Ltd.), having expressed his thanks for the invitation to be present, said the plant his firm had installed was of a kind with which most of the members were familiar, brought thoroughly up to date and fully modernized. Meetings such as they had had that afternoon were a great help to the industry, and they afforded an opportunity for contractors to meet the members of the profession and have a confidential chat.

VOLATILE PRODUCTS OF COAL CARBONIZATION.

Technical paper No. 140, issued by the United States Bureau of Mines, contains the suggestion that the use of inferior coal for the manufacture of illuminating gas might be found practicable, by utilizing low-temperature carbonization as an enriching process; a relatively large proportion of thin gas, such as blue water gas, being passed through the retorts and mixed with the light oil vapours.

A high-grade coal decomposes under heat, primarily into paraffin hydrocarbons, a completely altered non-volatile residue, and quite small quantities of water and carbon oxides which are first produced. Some other kinds of bituminous coal yield larger quantities of the oxygen compounds than gas coals; and such derivatives are of greater importance in industrial high-temperature carbonization, as also are the secondary reactions induced by the superheating of the hydrocarbons, than in low-temperature processes. The products of low-temperature carbonization of a coal of the Pittsburgh type, on an industrial scale, at 800° to 900° Fahr., are 1350 to 1560 c.ft. of rich gas, and 2 to 2½ cwt. of oil or tar, per ton of coal. The liquid consists of paraffins, with little or no benzene or naphthalene derivatives, and practically no free carbon. The gas will contain 6 to 7 p.ct. of unsaturated hydrocarbons, and 20 to 25 p.ct. of ethane and higher paraffins, and will therefore possess a high calorific and illuminating value. The tar may be subject to distillation or to cracking processes for the production of gasoline substitutes, of which it will yield at least double the quantity obtainable by high-temperature carbonization.

CARBONIZATION OF DUST AND SOOT.

[By a Dutch Correspondent.]

In a recent issue of "Het Gas," an account was given of some experiments made by Heer Alting, of the Amsterdam Eastern Gas-Works, with dust and soot as gas-producing materials. As in these critical times every grain of fuel has its value for gas-making purposes, the author had the idea of using refuse which might in ordinary times be regarded as valueless for the production of gas. The removal of the dust from the dust-catcher of the water-gas plant and the soot from the boiler-house flues is generally a problem, as nobody cares much to take them.

The aim was to mix the material with a sufficient quantity of coal tar, and to carbonize the resultant product in retorts temporarily out of action. The first trial was made with 50 kg. of water-gas dust, mixed with 15 kg. of raw tar. The mixture was carbonized for three hours at 1000° Celsius. The coke was valueless; being very soft, and easily reduced to powder. When the amount of tar was increased to 20 kg., there was obtained a coke of better quality, though still lacking in hardness. This was usable under steam-boilers. With 30 kg. of tar, the coke was hard and light grey in colour, being quite suitable for use as an ordinary fuel. When consumed in an open fire, it was found to last longer than ordinary gas coke and to give more heat; nothing but ashes being left in the grate. Further experiments with dust from other sources clearly showed that the amount of tar necessary to afford adequate binding, and resistance in the resultant coke, was at least 60 p.ct. of the weight of the dust.

As the intention was to remove as much valueless material as possible, the following experiments were made with the pitchy material from the hydraulic mains and the tar-separators. A mixture of 50 parts of water-gas dust and 30 parts of pitchy tar, carbonized for 3½ hours, produced 50 parts of small coke and 12½ parts of breeze. The coke was hard, light grey in colour, and was found to burn well. Not so hard, but otherwise of good quality, was the coke produced from a mixture of 25 parts of water-gas dust and the same amount of dust from the coal-gas plant. In this case, there were produced 47 parts of small coke and 18½ parts of breeze. In the same manner, there were treated dust from the roof of the water-gas plant, from the roof of the workshop, and from the flues of the boiler-house. This produced a coke which was very hard and dark grey in colour.

The result, therefore, is to show that mixtures of dust from various parts of a gas-works with 60 p.ct. of their weight of thick tar carbonized for 3 to 3½ hours at about 1000° Celsius gives coke that is usable as household fuel, and has the advantage of leaving only ash in the grate. The amount of ash, calculated as dry matter, of the different types of coke varied between 13 and 23 p.ct., the average being 15 p.ct. The point is whether this treatment of gas-works refuse is remunerative. A trial with about 10 metric tons of the mixture demonstrated that, when all charges had been taken into account, the cost price of the coke per ton was 8s. 11d.; the breeze being regarded as of no value. Thus, the proposal seems to be a practical method of utilizing the gas-works refuse referred to.

Examinations in Gas-Fitting.—The following employees of the Exeter Gas Company have been successful at the "Gas-Fitting" Examination lately held in that city: W. G. Lowton (Grade II.), J. A. Willmot (Final), A. Incledon (Final), and S. S. Adams (Final). Mr. Lowton has secured the second prize, Grade II. (bronze medal).

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Construction of Gas-Furnaces.

Sir,—May I take the opportunity of referring to the report printed in the "Journal" of the 24th inst., concerning my remarks in connection with Mr. Walter's paper read before the Society of Chemical Industry at their annual meeting in Birmingham on the previous Thursday?

I am reported to have said that I had not seen a well-designed gas-furnace. This is incorrect. I inferred that I had not seen a perfect annealing furnace, but that there are some very promising examples.

To anneal metal in a neutral and absolutely non-oxidizing atmosphere is a great objective; and to do so with a furnace of simple and practical design would be the acme of scientific progress.

Annealing muffles or ovens of scientific design referred to by Mr. Smith are like a few other types of annealing furnaces "up to date." Speaking in general terms, however, the very large majority of annealing muffles at present in use in the steel and metal industries are of primitive design; and the scope for improvement towards scientific annealing is a subject which is engaging, and will continue to engage for a long time to come, the best brains of furnace designers.

E. P. Taudevin.

23, *Leaside Avenue, Muswell Hill, N., July* 28, 1917.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 25.]

Nos. 10,240—10,525.

Bagnall, R. I.—"Indicating depth of liquids in tanks, &c." No. 10,464.

Bailey, T. H.—"Lamps or lanterns." No. 10,274.

Beard, G. F. H.—"Gasholder crowns and crown framings." No. 10,502.

Cooke, G. F.—"Venturi or choke tubes." No. 10,322.

Cooper, T. L. R.—"Utilization of energy of gases of combustion and of waste or exhaust fluids, and motive-power means therefor." No. 10,308.

Dempster, R. & J.—See Beard. No. 10,502.

Dempster & Sons, R.—"Vertical retorts." No. 10,283.

Dickinson, W. J.—See Cooper. No. 10,308.

Dunkley, W. H.—"Utilizing bodies of motor vehicles for storage of gas." No. 10,256.

Foster Engineering Company.—See Bagnall. No. 10,464.

Frais, S.—"Means for storing gases under pressure." No. 10,393.

Greig, A. C.—"Bunsen burner for lighting and heating." No. 10,282.

Grossmann, J.—"Method for obtainment of nitre-cake in a disintegrated or ground form." No. 10,286.

Heinz, E. J.—"Manfacturing coke." No. 10,411.

Heyl, G. E.—"Means for improving the distillate from sulphur-containing coal or shale." No. 10,433.

Heyl, G. E.—"Means for effecting agglomeration of spent residue from distillation of coal and shale into briquettes for combustion." No. 10,434.

Lyon, A. A.—See Cooper. No. 10,308.

Stark, A. H.—See Cooper. No. 10,308.

Theisen, H. E.—"Gas purifiers and coolers." No. 10,450.

Toogood, H. J.—See Dempster & Sons. No. 10,283.

Application for Restoration of Lapsed Patent.

Notice is given that William Brown Davidson, Alfred John Liversedge, and W. C. Holmes & Co., Ltd., have made application for the restoration of the patent granted for an invention entitled an "Improved gas-scrubber," No. 26,979 of 1911, and dated Dec. 2, which expired on Dec. 2, 1915, owing to the non-payment of the renewal fee.

Littleborough Gas Company.—At the half-yearly meeting last Thursday, the balance-sheet showed that the sales of gas for the last half year amounted to £5299, as against £5114 for the corresponding period of last year; the revenue profit being £1160, as compared with £1229. There was a balance of net profit (which was subject to the half-year's dividend) of £3810, against £3862. The usual dividend of 10 p.ct. per annum, less income-tax, was declared.

Darwen Gas-Workers' Wages.—The Darwen General Purposes Committee last week-end considered applications from the National Union of General Workers (formerly the Gas-Workers' Union) for increased wages for Corporation employees in almost every department. It was decided to recommend the Council to authorize an advance of 8s. per week on pre-war wages to all employees over 18 years of age, and 4s. under that age. In the Gas Department alone the increases over pre-war rates will total £1540 per year.

Brisk Demand for Gas-Cookers at Oldham.—At the last meeting of the Oldham Gas Committee, Mr. Isaac H. Massey (the Distribution Superintendent) reported that during the preceding fortnight there had been a brisk demand for gas-cookers, 144 having been supplied and fixed during that time. Alderman H. Wilde, J.P. (the Chairman of the Gas Committee), said the difficulty was the securing of labour for fixing. Women were being trained to do the work of the department; 24 now working as labourers, 11 as meter inspectors, and two as meter and stove fixers and repairers.

LEGAL INTELLIGENCE.

PREFERENTIAL CHARGES FOR ELECTRICITY.

A COMPLAINT BY THE GAS LIGHT AND COKE COMPANY.

Attorney-General v. Mayor and Corporation of Hackney.

JUDGMENT.

Judgment was delivered on Wednesday last in the action before Mr. Justice Astbury, in the Chancery Division of the High Court of Justice, in which plaintiff, suing at the instance of the Gas Light and Coke Company, complained that certain differentiation charges made by the defendants in the supply of electric energy were in breach of the Electric Lighting Act of 1882, and consequential relief and an injunction were sought [see "JOURNAL" *ante*, pp. 157-9].

Mr. Justice ASTBURY, after stating the facts of the case, proceeded as follows: The question of principle which is raised in this action is one of far-reaching importance to the owners of electric light undertakings in this country and to their customers. One of the principal objects of an electric light undertaking is to utilize its plant to the best advantage; and one method of accomplishing this result is to obtain customers for energy during the day as well as during the dark hours, and in each case to encourage customers whose hours of consumption do not synchronize, so that the diversity between them enables the plant to satisfy a greater number of hours of maximum demand than would otherwise be the case. The proportion of the actual number of units sold to the output capacity of the plant is termed, in this branch of industry, the "load factor" of the station; and the difference between the ratio of the load actually observed at the station to the sum of the loads at the consumers' terminals is termed the "diversity factor." Broadly stated, power users have a better load and diversity factor than light users, which accounts for their being usually charged a lower rate, because, other things being equal, the higher the load factor the lower the cost per unit of production, and the better the diversity factor the further the undertaking can go in the earning of revenue. The increase of the load and diversity factors therefore is of the greatest importance; and tariffs should be framed in order to obtain customers and classes of customers whose consumption contributes to this result. This being so, as a general rule it is obvious that a customer or a class of customers with a higher load factor, due to the taking of a different supply under different circumstances, is entitled, in the interests of the undertaking, to differential treatment in the matter of charges as compared with a customer or class of customers whose load and diversity factors are inferior. The sections of the Electric Lighting Act of 1882 which are in question are 19 and 20. Under section 19 it is enacted that: "Where a supply of electricity is supplied in any part of an area for private purposes, then, except in so far as is otherwise provided by the terms of the Licence, Order, or Special Act authorizing such supply, every company or person within that part of the area shall, on application, be entitled to a supply on the same terms on which any other company or person in such part of the area is entitled under similar circumstances to a corresponding supply." And section 20 provides that: "The undertakers shall not, in making any agreements for the supply of electricity, show any undue preference to any local authority, company, or person." In the present case, the exception in section 19 with regard to the Licence, Order, or Special Act does not apply; and it is the general enactment in the two sections which has to be considered. These sections say nothing about, and do not draw any distinction between, light, heat, or power users as such. The station turns out only one class of energy, which is measured in Board of Trade units; and the dissimilarity of circumstances and the non-correspondence of supply involved in section 19 must be looked for, not in any difference in the energy consumed or in the manner in which it is led into, and distributed by, wiring and meterage in the customers' premises, but in the circumstances of the customer in so far as they react upon the supply that he takes, and in the time, diversity, and quantity of his consumption. In other words, the purpose to which the consumer puts the energy which he purchases, whether for lighting, power, or heating, is *per se* irrelevant. It is in the *quantum* of, and the circumstances under which he takes, his supply of the one product that the undertaking offers for sale that the answer to the question as to undue preference must be looked for; and it is only for the purpose of classifying customers according to this test that they are, for convenience, divided into light, power, and heat classes—such purposes involving, as I have already pointed out, well recognized differences from the point of view of load factor, diversity factor, and quantity of units purchased. Customers may therefore be, and are in practice, divided into classes in accordance with these considerations, and they are charged with varying and different rates and classes of rates with the object of encouraging advantageous customers and classes of customers as well as of attempting to fairly adjust the respective advantages obtained by the station from all of them. This has led to what is termed different systems of supply being adopted—that is to say, for lighting, heat, power, &c.; the customers in each case taking the only thing that the undertakers have to sell, but under circumstances which affect differently the load factor of the station in both diversity and quantity. If the different systems of supply are fairly arrived at, and are at the choice of the customer, the preference prohibited by section 20 is between customers dealing under similar circumstances and not between customers dealing under different systems of supply, either of which they are free to select [see *Attorney-General for Victoria v. Melbourne Corporation*—1907 Appeal Cases, 469]; and to the extent that the customers under one system benefit the undertaking, in the way that I have described, to a greater degree than customers under another, so they are given a benefit in the scale of charges. This is expressed by Mr. Justice Sargant in the Long Eaton case in these words: "Any circumstances which render it less costly or otherwise more profitable to supply A than B constitute a legitimate reason for making a lower charge to A for the same supply." Nor is the right to differentiate the scale of charges confined to different classes of customers or to different systems. "There is left a latitude to the company to make bargains with its (individual) customers when circumstances differ or the supply does not correspond for different terms." Then what does corresponding supply mean? Does it mean that you are necessarily to treat the small customer upon equally advantageous terms with the large customer? The cost to the company may be very different—greater uniformity of demand, easier and less expensive collection of the amount to be paid, are circumstances to which regard must be had [Buckley, J., in *Metropolitan Electric Supply Company, Ltd., v. Ginder*, 1901, 2 Chancery, p. 811]. Therefore, any differentiation fairly arrived at between classes of customers or between customers in any one class *inter se* may be made by the undertaking, providing differentiation is not made between customers taking, or entitled to, supplies which correspond under similar circumstances, which is the only thing that is prohibited by sections 19 and 20. The plaintiffs in the present case rely on the Long Eaton decision. In that case the undertakers charged power users one rate for lighting and another rate for power, and provided that, under certain circumstances, a factory owner A should obtain his power supply at a less charge per unit than a factory owner B. Mr. Justice Sargant found as a fact that no circumstances existed in that case which rendered it less costly or more profitable for the station to supply A with power than to supply B for the same purpose, and that the supply of energy in the circumstances in the two cases corresponded and were similar. The learned Judge said: "Any supply of electricity for power is in the ordinary course taken quite separately from any other supply for lighting"—that, of course, was referring to the scale in that particular case—"namely, by a separate circuit connected with the mains by separate terminals and with a separate meter. This being so, I think that, according to any ordinary use of words, the Council must be said to be offering not a single supply of electricity but an alternative supply, and that any consumer taking for power and light in the ordinary way on separate circuits would be said to be taking, not a single supply but two supplies—namely, a supply for power and a supply for light; and I can see no sufficient reason for cutting-down the beneficial operation of section 19 so as to prevent its application to each such separate supply. In my judgment, the hypothetical consumer B, though taking a supply for power only, is taking a supply corresponding with the like supply of energy to A for power purposes, although A may also be taking an additional separate supply for light. And if any differentiation is allowed between them, *quâ* their respective supplies for power, it must be on the ground that the circumstances are not similar in the two cases." Then he adds what I think is the most important statement: "Under each section I think that the whole circumstances may be considered from the broadest possible point of view, and that one question is whether the circumstances affecting consumer A and consumer B in relation to their supply of power are substantially dissimilar or sufficiently dissimilar to justify broadly the differentiation proposed by the circular." After referring to certain authorities, the learned Judge then continued: "I think a fairly clear distinction may be drawn for the present purpose between those reasons for making a lower or preferential charge which under legislation of this kind are legitimate and those which are illegitimate. It would seem that A must not be charged less than B merely to overcome a greater reluctance on the part of A to become a customer, or to induce A to become a customer in respect of another supply, although either of these reasons might be a good commercial reason for charging less to A were the public undertakers merely carrying on any ordinary commercial business. Then he adds the passage that I have already read: "On the other hand, any circumstances which render it less costly or otherwise more profitable to supply A than to supply B constitute a legitimate reason for making a lower charge to A for the same supply." The Long Eaton decision was affirmed in the Court of Appeal; and the present Master of the Rolls in giving judgment, said this: "Suppose there are two factories, similar in situation, similar in extent, both of which are supplied with electricity for lighting and for power. Is there any reason for justifying different charges being made to the owners of the factories because one of them may have a portion of his factory, or another small factory, which is not supplied with electric lighting, but is supplied with gas, or acetylene gas, or whatever it may be? It seems to me that such a differentiation would be directly contrary to section 19, which says that each of these two owners is to be entitled to a supply on the same terms. They are not supplied on the same terms, though the circumstances are similar." In the present case before me, although the wording of the 1914 circular of the defendants, on which the action was launched, may be ambiguous, in the sense that the 20 p.ct. for light in the case of the power users was not expressly stated to be limited to factory lighting, his was put right in the circular and scale of charges issued in 1916, before the date of the writ; and in practice the defendants have not allowed the user of the 20 p ct. in question for purposes other than the lighting of the factory or workshop taking the power supply, nor have they threatened, or intended to do so, nor apparently has anybody thought that such was the case. And I allowed an amendment of the pleadings raising the 1916 circular in order that the case might be determined; and it has accordingly been argued upon the true facts.

In the Long Eaton case, the undertakers differentiated between different members of one class of users—namely, factory or power users—without, as found by the Court, any corresponding benefit accruing to the Company or any legitimate reason existing for doing so.

In the case now before me, all power users are placed on the same basis They all take one supply at the same rate or price per unit, and they are all allowed to use 20 p.ct. of such supply for lighting their factories or workshops, which must be lighted by some means or other if they are to take power supply at all.

A similar practice has been sanctioned by Parliament in many power companies, as explained in the evidence. That is to say, Parliament has sanctioned power companies competing with lighting companies in various districts on the terms that one-fifth of the supply taken by

the power user may be employed for light—this being based on the fact that factory and workshop lighting does not as a rule amount to, or exceed, one-fifth of the total quantity of energy taken. This treatment of power users, by avoiding, *inter alia*, the expenses of alternative or double supplies and extra wiring and meterage costs, is not suggested to be otherwise than a sound commercial plan for dealing with the owners and occupiers of factories and workshops, and, by increasing the load and diversity factors at the station and the total energy consumed, must tend, as soon as power customers are obtained in sufficient quantity, to improve the position and prospects of the undertaking (as it has long since done in Hackney), and is, in my judgment, a legal method of carrying on the undertaking. The plaintiff contends that, *quâ* the 20 p ct. used for lighting purposes, the power users are given an undue preference over the ordinary "light" users of the borough; but in my judgment the circumstances affecting the latter in relation to their supply are substantially different and dissimilar, and justify, in the interests of the undertaking, the differentiation, if such it can be called, in their treatment. All factory or power users are put upon one basis and all non-power users on another; and I think that the true test in the case of the power user must take into account his total factory consumption and not the percentage of his supply that goes to meet one item only of his factory requirements. The 20 p.ct. arrangement is really only a particular method of reducing or regulating what would otherwise be the charge per unit for power. The plaintiff contends—and I think wrongly—that a light user who, as compared with a power user, has a bad load factor, little or no diversity factor, and whose consumption is relatively small, takes his light by way of corresponding supply and under similar circumstances if the light supply alone of the power user is considered. This is not in my judgment the fact, nor do I think that, for the purpose of considering sections 19 and 20, the amount of the total consumption of the power customer ought to be split up, and only one portion of it considered for the purpose of deciding whether the power customer himself, whose load factor is as a general rule the better, whose diversity factor is necessarily better, and whose consumption is entirely different, takes a corresponding supply under similar circumstances and is unduly preferred as compared with the light customer. The plaintiff has called evidence for the purpose of attempting to show that in the year 1913-14—the last full year before the war—the power users were supplied by defendants at a loss, and therefore that the test laid down in the Long Eaton case was not complied with. In the circumstances of the present case, I do not think that such evidence is relevant to anything that I have to decide, nor do I think it establishes that the defendants did not profitably carry on their undertaking, or that they supplied energy for power in the year in question at a loss. The defendants have called evidence in answer, and a great mass of figures and accounts have been put in. All I propose to say on this part of the case is that if the contention so raised on the evidence by the plaintiff is relevant, he has not established the facts on which he relies in its support.

I will now deal with a series of hypotheses or propositions put forward on behalf of the plaintiff in reply, which it is said bring this case within the decision in the Long Eaton case, and establish that an undue preference is given by the defendants *quâ* the 20 p.ct. of energy taken by the power customer who avails himself of the option in question and uses it for light.

(1) It is said that a factory owner in Hackney who takes light and no power pays more for his light than an owner of a similar factory who takes both. Why should not he? There is no magic in his having a factory as distinct from any other kind of building for which he takes light alone. The Act does not say that all owners of factories, independently of their circumstances and supply, are to pay the same rate, and this is simply the case of a light user and power user as between whom, for reasons I have stated, the undertakers are entitled to differentiate.

(2) It is next stated that the 20 p.ct. is not equivalent to a reduction in the price of power to get the power customer in, in that it does not reduce the charge for power because the customer takes light, but only reduces the charge for light because the customer takes power. This is plausible, but I think fallacious. What the station alone is concerned with is the *quantum* and diversity of the customers' supply. And it is with the customers as individual users that the Statute is concerned. If one customer takes a totally different supply under totally different circumstances to another customer, it is irrelevant that he is allowed to allocate a portion of his whole supply, which *ex hypothesi* he is entitled to at a lower rate, to a purpose similar to that to which another customer paying a higher rate, because of the difference in his circumstances and supply, devotes the whole of his. This attempt to place the light customer and the power customer *quâ* his 20 p.ct. at Hackney in the position of two light customers corresponding to the two power customers in the Long Eaton case is entirely misleading. In the Long Eaton case, the two hypothetical customers were found, in fact, to be power customers whose supplies and circumstances were corresponding and similar; whereas in the present case the customers contrasted differ *in toto*, both as to supply and circumstances. And it does not alter the fact that the power customer takes under different circumstances a different supply for the whole of which he is entitled to a rate proportionate to his demand, that he uses one fifth of his supply for light or for any other factory purpose.

(3) It is then said that if you take the case of a power customer lighting his factory by gas, whose supply equals 100, all of which he uses for power, changing-over to electric lighting without otherwise altering his factory, and then taking a supply of 125, his power position is not altered, and that he is getting a new light supply of 25 on terms different and unfair to the light consumers. This involves the same policy. When the customer took his power supply of 100, he, in common with all other customers of the same class, was entitled, if he had been so minded, to use 20 p.ct. for light; and when he increased his total supply to 125, his relative position is in no way altered.

(4) Similar arguments were used with reference to a power user who, before the 20 p.ct. option was given, used the defendants' energy for lighting and for power, and after the change used the same amount for power and light, but paid less for the latter. What he really pays less for is for the whole.

(5) Finally, it is said that you must not mulct a light customer because he will not take power. I agree. You must treat him as the defendants have treated all light users whose supplies and circumstances are similar—on terms of equality.

For the reasons that I have endeavoured to give at some length, I am of opinion that no breach of the provisions of sections 19 and 20 of the Act of 1882 by the defendants has been established, and that they have not threatened or intended to supply energy otherwise than in accordance therewith. The action must therefore be dismissed with costs to be paid by the relators.

Mr. PERCY WHEELER (for the plaintiff): With regard to the costs, I rather gather from your Lordship's judgment that the defendants have escaped from the result of the Long Eaton case by reason of the amended circular and their amended defence; otherwise they would have come exactly within the judgment of the Master of the Rolls in having issued their previous circular in such ambiguous terms that the action was justifiable.

His LORDSHIP: I do not agree.

His LORDSHIP, on the application of Counsel, agreed to extend the time for giving notice of appeal to three months.

WILTS COUNTY GAS COMPANY, LTD.

The Official Receiver in the Company Winding-Up Division of the High Court of Justice has now issued his report under the liquidation of the Wilts County Gas Light and Coke Company, Limited, of No. 14, Victoria Street, S.W, and Pewsey, Wilts. From this, it appears that a statement of affairs has been filed, showing gross liabilities as regards creditors amounting to £652, of which £574 is due to unsecured creditors. The assets are estimated to produce £2929, from which £23 has to be deducted for the claims of preferential creditors payable in full, leaving the net assets at £2906, and showing an established surplus of assets over liabilities of £2358. With regard to contributories, the paid-up capital of the Company is £15,000, to meet which there is the above estimated surplus of £2358, leaving a total deficiency as regards contributories of £12,641.

The Company was, the report of the Official Receiver states, registered on June 23, 1914, with a nominal capital of £30,000, divided into 3000 7 p.ct. preference and 3000 ordinary shares of £5 each, for the purpose of manufacturing, selling, and supplying gas in Pewsey and the adjacent districts. The first Directors, who were appointed by the Articles of Association, were Sir George Kekewich, K.C.B. (Chairman), Frederick Charles Murray. Frederick Colman, and Albert Augustus Scanlan. Murray resigned, Colman is dead, Scanlan is on active service, and on Dec. 5, 1916, William Judd (the Secretary) was appointed to the Board to make a quorum. The qualification was the holding of one share; and the remuneration was fixed at fifty guineas per annum each, with fifty guineas extra to the Chairman. Sir George Kekewich has, however, refused to accept fees since May, 1916.

The Company was promoted by the United Gas-Works Development Company, Ltd., which appears to have been controlled by H. H, D'Aeth and James Gordon. The prospectus disclosed the following agreements between the Development Company and a Trustee on behalf of the Company: (*a*) For the purchase by the Company of freehold property at Pewsey, with the gas-works and buildings thereon, and all machinery, plant, gas-mains, &c., for £6450, payable as to £4450 in cash and as to £2000 in cash or shares at the option of the Company, together with the stock of coal, &c., at a valuation. (*b*) For the provision by the Development Company of the preliminary expenses up to £1800, in consideration for which the Company were to repay the £1800 and to allot as bonus 150 preference shares as fully-paid. By this agreement, the Development Company undertook to guarantee the interest on the issued capital for the first year—viz., 7 p.ct. on preference and 8 p.ct. on ordinary shares. (*c*) For the underwriting by the Development Company of £8000 capital for a commission of 7½ p.ct. No valuation of the property was obtained on behalf of the Company; but a report by Mr. George A. Smith (gas engineer) addressed to the Directors was printed and circulated with the prospectus. This report showed an estimated net profit of £4946 per annum, on the assumption that the mains would be extended to surrounding districts, and the gas supplied by the Company should reach 39,500,000 c.ft. per annum.

The Directors went to allotment on July 3, 1914, and between then and Aug. 5 issued, in response to prospectus applications, 938 preference shares and 1373 ordinary shares, representing respectively £4690 and £6865; nine shares taken up by the signatories and directors (£45); and 350 preference and 350 ordinary shares (£3500) issued as fully-paid—bringing the total issued capital to £15,100.

No independent inquiries in connection with the purchase appear to have been made by the Directors, who seem to have assented without demur to all the promoters' suggestions for the terms of purchase. The title deeds show that the property was acquired by D'Aeth from the Pewsey Gas Company, Ltd., in liquidation, on June 15, 1914, for £1300 in cash, and that he conveyed it to the Development Company three days later for £2500. The Directors took no steps to extend the mains beyond Pewsey, owing, the Secretary states, to the subscribed capital being insufficient. The accounts show:

For the year ended June 30. 1915, a loss of.	£1718
,, ,, ,, 1916, ,, ,, ...	1849
For nine months ended March 31, 1917, a loss of . . .	268

This result is attributed partly to mismanagement by the manager of the gas-works and to his irregularities, in respect of some of which he was convicted and sentenced in July, 1916. The quantity of gas sold has averaged less than 2,000,000 c.ft. per annum. A dividend for the first year of 7 p.ct. on the preference shares and 8 p.ct. on the ordinary shares was paid, out of a sum of £1015 provided by the Development Company, under the terms of an agreement.

In February, 1915, the Company advanced, for three months, after Counsel's opinion had been obtained that it had power to do so, £1000,

at 10 p.ct. interest, to the Development Company, on the security of £1000 debentures in that Company, and 4500 fully-paid shares of £1 each in the Mutual Industrial Corporation, Ltd. (another Company in which D'Aeth and Gordon were interested), and the guarantee of D'Aeth and Gordon. Of this amount, £360 was repaid; and judgment for a sum of £693 with interest, and £53 costs, has been obtained against D'Aeth and Gordon. But so far it has been fruitless. Both the Development Company and the Mutual Industrial Corporation are in liquidation. The debentures are understood to be, and the shares in the Mutual Industrial Corporation are, in fact, worthless. A sum of £500 was also advanced in July, 1915, on debentures to the East Pembrokeshire Light and Coke Company, Ltd.—another Company promoted by the Development Company; and on March 6, 1917, Judd was appointed by the Company as Receiver on its behalf. He is continuing the business, and states that the loan will eventually be repaid in full. The Directors state that at the dates when the advances were made the Company were not requiring use of the whole of their cash; and that they judged the Company would be benefited by the interest.

In March, 1917, the Company, having come to the end of the funds, and being unable to raise money by the issue of debentures, had to close-down the works. Subsequently an execution was levied there, on behalf of the petitioning creditor, under which all the moveable assets were sold, realizing £68.

KOPPERS COKE-OVEN PATENTS.

A Document from Germany.

A new phase in the conflict over the Koppers coke-oven patents was opened in the Patents Court, before the Controller (Mr. Temple Franks), last Thursday. The stages in these proceedings [see "JOURNAL" *ante* p. 26, and Vol. CXXXVIII., pp. 153, 346, 628] may be briefly indicated as follows: Messrs. Simon-Carves, Ltd., applied for a licence to use the two German patents No. 20,870 of 1904 and No. 16,386 of 1905. Mr. Victor Derry (a British subject who changed his name from Kochs by deed poll) opposed the application, urging that Koppers passed on the English rights in his patents to a partnership consisting of Koppers, Derry, and C. R. Altenhein, and known as the Koppers Coke-Oven and Bye-Products Company. Mr. Derry now sought to put in a new document from Koppers; and Messrs. Simon-Carves opposed his application.

Mr. HUNTER GRAY appeared for Messrs. Simon-Carves; and Mr. H. TERRELL, K.C., M.P., represented Mr. Derry.

Mr. GRAY objected to the presentation of the new document from Koppers. He submitted: (1) That it was *ultra vires;* (2) that he was entitled to cross-examine Koppers if the Court paid any attention to the letter; and (3), that the opinion of Koppers (if it was no more than an opinion) was worth no more than Mr. Derry's, and that was worth nothing at all. A letter had been sent to Koppers which practically said: "It would be for your benefit, for the purpose of this opposition, to say that the patents belong to the partnership." It announced that "an application to work or suspend our British patents" had been made, and indicated Mr. Derry's line of opposition. It showed something was going to interfere with the goodwill which Koppers eventually hoped was coming back to him. "As you are aware," the letter went on, "it has long been the intention to have the patents formally assigned to the firm, and but for your absence in America in 1913, and mine in India, this would have been carried out before the outbreak of war. I should be glad if you would kindly send me an indication (preferably in your own handwriting), stating that it has been understood and agreed that the patents taken out by you in this country, at or since 1902, were the property of the three partners, in the proportion of half to yourself and a quarter each to Altenhein and myself, when I should have no difficulty in establishing the rights of the firm." Koppers replied: "In answer to your letter of May 4, I herewith testify that it has been understood and agreed that the patents taken out by me at or since 1902, are the property of the three partners forming the Koppers Coke-Oven and Bye Product Company, Sheffield, in the proportion of half to myself and one-fourth each to Mr. C. R. Altenhein and Mr. A. Victor Derry." It was further stated that Otto Ohnesorge, a patent agent of Bochum, had made a statutory declaration that Koppers, on April 3, 1913, instructed him by letter from New York to transfer the whole of his English patents to the partnership. The directions, however, were not executed, as Mr. Koppers and Mr. Kochs were travelling. Mr. Gray contended that this letter ought not to have been sent to Mr. Koppers. If it was sent, it should first have been submitted to the Controller and himself.

Mr. TERRELL said he sent the letter at the suggestion, as he took it, of Mr. Justice Younger, who indicated a way by which this might be done.

The CONTROLLER held that this document of Mr. Koppers could only be put on the register if it affected the proprietorship of the patents. Standing by itself, he did not see how it could do this as it was a document made during the war.

Alleged Passing-Off of Incandescent Mantles.

On Friday last, the case of *The Wholesale Fittings Company, Ltd. v. L. Bernstein* came before Mr. Justice Younger, in the Chancery Division of the High Court, upon a motion for an injunction to restrain defendant, his servants, and agents, until judgment or further order, from in any manner representing that he was employed by, or connected with, the plaintiffs, or authorized to represent them, or to supply their goods, and from passing off, or attempting to pass off, incandescent mantles, or other goods not being the plaintiffs' goods, as and for the goods of the plaintiffs. Mr. Sebastian represented the plaintiffs. Defendant, who appeared in person, submitted to an injunction in the terms asked. Mr. Sebastian said it had been agreed to treat the motion as the trial of the action, and to take a perpetual injunction in the terms of the notice of motion. Considering the financial position of defendant, plaintiffs did not ask for costs. His Lordship said this was the second time defendant had been let off the costs; and he strongly advised him to sell his own mantles in the future.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Sheffield United Gas Light Bill was read the third time, with the amendments, further amendments made, passed, and returned to the Commons.

The Gas and Water Provisional Orders Bill was read the third time, according to order, and passed.

The South Eastern and London, Chatham, and Dover Railways Bill was read the third time, with the amendments, passed, and returned to the Commons.

HOUSE OF COMMONS.

Sulphate of Ammonia.

Mr. ACLAND asked whether the President of the Board of Agriculture was aware that during 1916 flat-rates were fixed for the sale of large quantities of sulphate of ammonia to farmers at prices considerably lower than those on the open market; that these prices made it a very attractive purchase to farmers, from which they had in general derived considerable benefit; that during two and a half months in the spring of that year export was suspended so that the supply for agricultural purposes might be ample; that the prohibition of export was finally withdrawn only because congestion at the makers' works threatened to interfere with the supply of necessary materials for munitions; that the rates fixed by the late Government were accepted by their successors as being fair and attractive to farmers; and whether a great deal of the increased use of sulphate of ammonia during the present season had been due to the efforts made in 1915 and 1916 to popularize and increase the use of this fertilizer?

Mr. PROTHERO, the President of the Board of Agriculture, said that the reply to the first four parts of the question was in the affirmative. The rates fixed by the late Government were used as the basis for subsequent negotiations with makers. But the altered system of distribution arranged in February last helped to stimulate the demand; and during the four months, February to May, 1917, the quantity sold for agricultural purposes was 99,875 tons, as compared with 35,128 tons in the same period of the preceding year.

MISCELLANEOUS NEWS.

EDINBURGH AND LEITH GAS ACCOUNTS.

The revenue account of the Edinburgh and Leith Gas Commissioners for the year ended May 15 shows a total income of £434,367, and an expenditure of £322,460, leaving a balance carried to net revenue account of £111,907, which is £6289 less than that for the previous year. The proceeds from the sale of gas are higher by £11,659 (due to the increase in price); those from coke, by £7997; while toluol and benzol—a new item—have brought in £18,657 (nearly 2½d. per 1000 c.ft. of gas sold). Tar and sulphate of ammonia, however, did not do as well as in 1915-16. As regards expenditure, coal cost over £28,000 more (equal to 3s 2·18d. per ton); repairs and maintenance of works increased by £4543; rates and taxes, by £8435; and war service allowances, by £1486.

The charges against the net revenue account are: Annuities, £25,892; interest, &c., £36,106; sinking fund contributions, £33,036; reserve fund contributions, £21,516—a total of £116,550. This shows that the year's working resulted in a deficiency of £4643, which has been met by drawing upon the surplus of £5878 from the year 1915-16, leaving a credit balance on the account of £1235, as compared with a surplus estimated last September of £1003.

In his explanatory letter to the Finance and Law Committee, the Treasurer (Mr. A. Canning Williams) points out how very closely many of the estimated figures approach the actual ones. The convener of the Committee (Mr. Douglas Elliot), in moving the adoption of the accounts, also referred to this, and said he thought congratulations should be offered to the officials on the fact that, though they had had to deal with so large a revenue as £434,000, the difference between the estimated and the actual surplus was only about £200.

The quantity of gas sold during the year was 1,874,114,100 c.ft., a decrease of 75,299,900 c.ft. (3·86 p.ct.) on the previous year's sale. The make of gas per ton of coal and oil equivalent was 10,725 c.ft. (against 10,958 c.ft.); and the unaccounted-for gas was equal to 6·26 p.ct. (against 5·75 p.ct.) on the make.

On capital account, £2248 had been spent for additional meters; but as £2516 had been written-off in respect of depreciation on cookers, fires, &c., the net result was that the total capital expenditure, which stood at £1,832,965 on May 15, 1916, had been reduced to £1,832,697. Annuities and mortgages amounting to £48,634 had been redeemed during the year, and the financial position of the undertaking improved by £60,180—viz.:

Sinking fund contributions and interest	£36,611
Saving on purchase during year of annuities below their capitalized value	4,932
General reserve fund increased by	2,655
Amount written-off dead capital in respect of old works	20,625
	£64,823
Profit and loss account—credit balance reduced by	4,643
	£60,180

As Mr. Williams observes in his memorandum, the times are so much out of joint that no very useful purpose would be served by

an elaborate comparison of the figures for 1916-17 with those for 1915-16. There is, however, something to be said for making a comparison between the year 1916-17 and the pre-war year 1913-14.

Sale of Gas.

	Year Ended May 15, 1914. Cubic Feet.		Year Ended May 15, 1917. Cubic Feet.
Ordinary consumers	1,660,947,700	..	1,567,388,000
Engines, &c.	114,411,600	..	135,771,600
Prepayment consumers	91,180,600	..	113,904,100
Stair lights	66,843,600	..	52,375,500
Public lamps	83,491,400	..	1,022,300
In bulk	2,366,800	..	3,652,600
Total	2,019,241,700	..	1,874,114,100
Gas made per ton of coal and oil equivalent	11,003 c.ft.	..	10,725 c.ft.
Average cost of coal and oil equivalent per ton	13s. 5·53d.	..	17s. 9·68d.
Cost of coal and oil per 1000 c.ft. of gas made	1s. 2·68d.	..	1s. 7·92d.
Net revenue from residual products per ton of coal and oil equivalent	8s. 4·57d.	..	12s. 2·94d.
Number of ordinary consumers	83,656	..	83,168
Number of prepayment consumers	12,650	..	15,370
Price of gas to ordinary consumers	2s. 8d.	..	3s. 4d.
,, ,, prepayment consumers	3s. 3d.	..	3s. 9½d.
Average price of gas per 1000 c.ft.	2s. 7·18 net	..	3s. 2·99d. net
Number of gas-cookers on free loan	16,592	..	19,210
Number of gas fires and radiators on simple hire	5,141	..	8,331

Adverse war effects may be seen in the reduced gas consumption of the public lamps (from over 83,000,000 c.ft. to a little more than 1,000,000 c.ft.), in the higher cost of coal and oil equivalent, and in the price of gas. On the other hand, the net revenue from residuals has risen very considerably, and the number of gas-cookers on free loan, and fires, &c., on hire, has materially advanced. No doubt in any case these appliances would have shown an increase; but the war has accelerated it.

The Convener of the Works Committee (Mr. Lindsay), in referring to the recent Coal Transport Order, said that they, as Commissioners, would not be greatly affected or inconvenienced by the order. They had recently bought 195,000 tons of coal; and only some 15,000 or 20,000 tons of this would be affected. They had hitherto drawn their supplies, other things being equal, from the nearest possible collieries. By September, most of the 15,000 to 20,000 tons would be delivered.

ANNUAL REPORT AT BUXTON.

In presenting his sixth annual report to the Buxton Gas Committee, Mr. F. G. Shaw (the Gas Engineer and Manager) says that, considering the small increase made in the price of gas compared with most other undertakings, the decreased output of gas, and the difficulties caused by the war, he thinks the net profit of £1536 for the year ended March 31 will be regarded as satisfactory. The price of gas for lighting is 2s. 9d., and for cooking, heating, and power 2s. 6d. per 1000 c.ft. —in each case subject to 5 p.ct. discount for prompt payment. The gas made was 116,346,000 c.ft., or 12,002 c.ft. per ton of coal carbonized; the figures for the preceding year having been 131,968,000 and 12,049 c.ft. respectively. On this occasion, the percentage of unaccounted-for gas is 5·62; whereas a year ago the figure was 5·14. The net profit of £1536 now compares with £2595 twelve months ago.

Dealing with the working results, Mr. Shaw remarks that the decreased output of gas for the past year compared with the previous year is 15,622,000 c.ft., and the reduction in the coal carbonized is 1258 tons. The decrease is due to the lighting restrictions, daylight saving, and the smaller number of soldiers billeted in the town. The residuals results, and generally the working results, are very satisfactory indeed. The coke sold (10 cwt. per ton of coal) is gratifying; and it is most timely that the improvement in this item should be brought about during the period of good prices. The gas accounted for shows an increase in percentage on the reduced make, due to the large number of leakages from fractured mains and services caused by the hard frosts of the past winter. The figure is better than was expected. The financial results are satisfactory. Coal, owing to the reduced quantity carbonized, has cost £1009 less than last year. The outstanding feature of the expenditure is the rates and taxes item—£2005—which is £707 more than last year, and £1317 more than it was in 1912, when a similar tonnage of coal was carbonized. The revenue shows a reduction in income from gas sold of £1793. The past year has been a most trying and anxious one—especially during the winter. Thanks, however, to the loyal manner in which the staff and workmen have done their duty, and a certain amount of good fortune, no accidents of a serious nature have occurred. Hardly the bare minimum number of men fit for the arduous and exacting work necessary to keep up the supply of gas now remain. On several occasions, the pressure of gas to the town has had to be reduced, through lack of men fit for stoking work.

SMETHWICK GAS ACCOUNTS.

Mr. W. J. Sturges, the Secretary to the County Borough of Smethwick Gas Department, in his report to the Gas Committee, when submitting the accounts for the year ended March 31, says that the total income from all sources on revenue account amounted to £97,587, compared with £93,148 in the previous year—an increase of £4439. The net revenue from sales of gas was £68,026, being an increase of £124; and the average net price realized for all gas sold was 2s. 5·038d. per 1000 c.ft., as against 2s. 5·156d. The total quantity of gas sold and accounted for was 562,243,400 c.ft., an increase of 3,297,600 c.ft., or 0·59 p.ct. The quantity of gas unaccounted for, due to leakage, condensation, &c., was 32,223,700 c.ft., or 5·42 p.ct. of the gas sent out, as against 5·45 p.ct. in the previous year.

Collections from prepayment meters averaged £2 15s. 5d. per meter for the year; and the average consumption per meter was 16,630 c.ft. The aggregate income derived from residual products was £29,191, as compared with £24,901, an increase of £4290. An additional item of revenue—spent oxide—is this year brought into account under residuals, as the sales of this material have, in addition to defraying the entire cost of purification of gas, brought in a surplus of £352. The total expenditure on revenue account amounted to £76,718, which is an increase of £2468. The average cost of coal carbonized was 20s. 8·8d. per ton, against 19s. 11·7d. the previous year; and the net cost of manufacture of gas, after deducting the value of residual products, works out at 1s. 1·316d. per 1000 c.ft., as compared with 1s. 3·026d. or 1·71d. per 1000 c.ft. less than in the previous year. Public lighting charges show a decrease of £1137; and rates and taxes an increase of £1651. The total amount paid in wages during the year was £19,531, an increase of £1009.

The gross profit on the year's trading was £20,869, as compared with £18,898. To the balance of £7108 brought forward from the previous year has been added the gross profit from revenue account of £20,869. After making due provision for interest on loans and redemption and extinction of debt, amounting in the aggregate to £12,960, there remains as the net profit for the year the sum of £7909, an increase of £1205. Allowing for the contributions of £50 to the funds of the Free Library Committee, and £181 for public lighting to the general district rate, there remains a balance of the year's net profit of £7677 transferred to the depreciation and extension fund account, which leaves the profit and loss account with a balance of £7108 to carry forward, as in previous years. This account commenced the year with a debit balance of £3028; and further expenditure on vertical retorts amounting to £277 has been added, making a total of £3305 5s. 10d. After crediting the sum of £7677 brought from the profit and loss account, there remains a balance to the good of £4372 available for further extensions and improvements now in hand or in contemplation.

Comparative Statement of Working Results.

	1916.	1917.
Coal carbonized . . . . . tons	45,277	45,189
Gas made total . . . . cubic feet	591,028,000	594,467,100
Coal gas . . . . . ,,	577,981,000	590,665,100
Per ton of coal . . . ,,	12,765	13,071
Water gas . . . . . ,,	13,047,000	3,802,000
Gas unaccounted for . . . . per ct.	5·45	5·42
Proportion of gas sold to private consumers—		
Lighting purposes . . . per ct.	74·55	72·32
Power . . . . . ,,	24·13	27·62
Public lighting . . . . . ,,	1·32	0·06

THE DUKINFIELD GASHOLDER FATALITY.

Verdict of the Coroner's Jury.

On Monday of last week, Mr. J. A. K. Ferns (the Deputy-Coroner for Cheshire) resumed the inquiry into the circumstances attending the death, on June 14, of George Greenhalgh, a labourer employed at the Dukinfield Gas-Works, who received fatal burns on the occasion of the munition works explosion at Ashton the previous day, as fully recorded in the "Journal" at the time. At the opening of the inquest, only the evidence of the widow as to identification was given.

Mr. Allen Howard represented the Dukinfield Corporation and Mrs. Greenhalgh. There were present Mr. W. F. Ireland (H.M. Inspector of Factories), and Mr. W. Lindley (Manager of the Gas-Works).

George Lindley, foreman at the gas-works, said on June 13 he was at the gas-works at 4.15, when his attention was called to a fire about 300 yards away, in Ashton. The building was ablaze from end to end. He climbed to the top of one of the gasholders to get a better view. A dense volume of black smoke and flame was being blown towards the gasholders from the chemical works. He deemed it safer to leave the top of the holder, and he got on the oxide shed. The moment he got on the shed, a loud explosion occurred at the chemical works. Everything went dark; and he found himself lying on the ground close by the boundary wall dividing the canal and the gas-works. The force of the explosion had carried him about 50 ft. He did not think he lost consciousness. He heard a voice calling for help, and going to the place whence the call came, found Greenhalgh about 30 yards from the gasholder. He was staggering about the yard with his clothing on fire. Witness tore the clothes from his body, and wrapped his own jacket round him. He then left Greenhalgh in charge of two of the workmen, hurried into the works, and closed the valve of the gasholder in use. The other holder was shut-down. He next went and shut-down the plant, to prevent any explosion. At this time the gasholder in use was in full blaze. The hot material which came flying over from the chemical works perforated the holder, liberated the gas, and set it on fire.

Mr. Howard: Then Greenhalgh must have been set on fire by the burning gas coming from the holder?

Witness: Yes.

He must have been near the holder?—Yes. Near No. 1 holder.

In your opinion, there was no explosion at the gas-works?—None whatever.

Did the gasholder seem to collapse?—Yes.

The Deputy-Coroner, in summing up, after further evidence had been given, said that no one at the gas-works was to blame. The gasholder got on fire, and Greenhalgh was fatally burned. The foreman Lindley showed very courageous conduct after he had been blown a considerable distance, in going to Greenhalgh and extinguishing his burning clothing. He also showed commendable coolness in shutting off the gas supply and preventing further damage. From the evidence given, the only verdict the Jury could return was that Greenhalgh met his death through shock from burns sustained by the firing of the gasholders through the explosion at the chemical works.

The Jury returned a verdict of "Accidental death."

WELSBACH LIGHT COMPANY, LTD.

A Dividend of 5 p.ct. Declared.

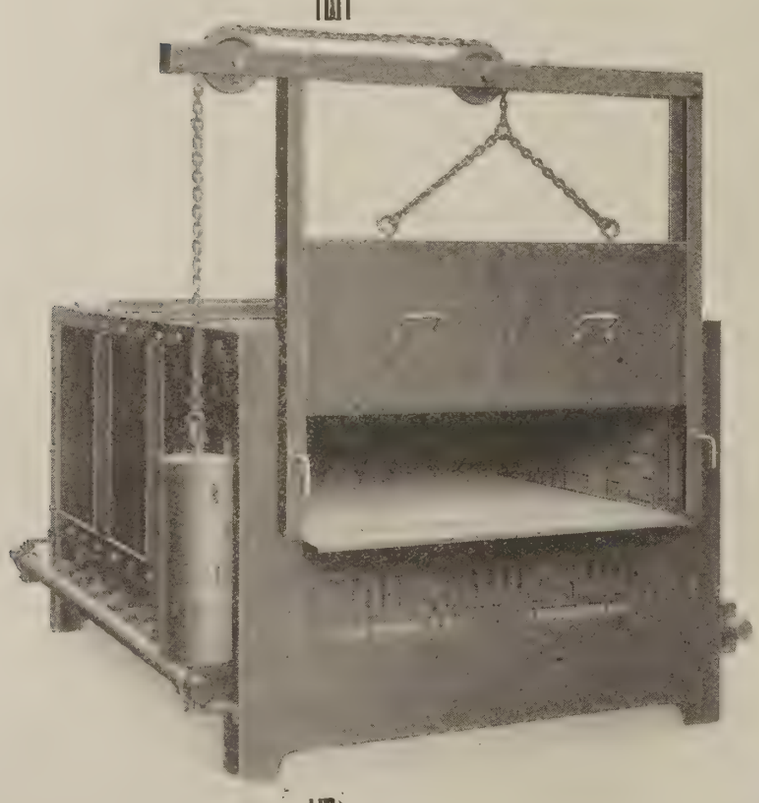
The Sixth Annual General Meeting of the Company was held las Thursday, at Winchester House, Old Broad S·reet, E.C.—Mr. J. R Yates (the Chairman) presiding.

The Secretary (Mr. E. J. Butcher) read the notice convening th meeting, and the Auditors' certificate ; and the report of the Director and the statement of accounts were taken as read.

The Chairman, on rising, said that for the third year they were meeting in an atmosphere of war. To no commercial concern had this meant more than to the Welsbach Company ; and to no body of men vested with the responsibility of directing a public company had it meant more than to this Board. Now that they were in a position to present such a balance-sheet as that to which he was about to refer, it was not inopportune to point out that from the outbreak of war the Directors had had to face a position, not only of difficulty, but of peril to the interests of the Company ; and no one could then have predicted that they would at the present date have been able to come before the proprietors showing a condition of recuperation and stability such as was now disclosed. Among other entanglements which they inherited, there was the huge Austrian investment on the one hand, and, on the other, the still larger holding in this Company of the German Company (the D.G.A.). Further, the cutting-off of supplies of raw material, and the endless trading difficulties, contributed to a situation calling for the most careful and judicious handling, both on the commercial side and as regarded what might be termed the higher policy and direction of the Company. It required an unprecedented amount of daily and continuous work, thought, and initiative in order, if possible, to preserve the capital and safeguard an important British industry. The negotiations which, with the concurrence of the Foreign Office, the Board of Trade, and the Public Trustee, took place at Berne last September, culminated in the agreement by which the Company sold to the D.G.A. their entire shareholding in the Austrian Company, receiving in exchance the whole of the shares and debenture stock held in the Company by the D.G.A. In addition to taking over the German-owned shares, which numbered 173,048 out of the total of 265,000 shares, and £68,359 of debenture stock, out of the then outstanding amount of £212,000, the Company received also a release from certain debts and claims amounting to £3154 ; and they would be entitled to receive from the Public Trustee dividends and interest accrued on the shares and debenture stock taken over, amounting to £9710, as well as the balance of a cash payment of £5000 undertaken by the D.G.A. This cash payment the D.G.A. were entitled to satisfy by tendering further debenture stock at the price of 70 p.ct., which they had done to the extent of £5762 of stock ; so that only a sum of £966 in cash would now be accruing under this head, to be paid in due course out of the funds in the hands of the Public Trustee.

The Elimination of the Austrian and German Interests.

This momentous deal with the D.G.A. was of undoubted benefit to their Company. What did they give up? They gave up the Austrian asset, standing in their books at £179,617, but, with the existing outlook, having no immediate value, and very little potential value, for their Company—an asset which they could not effectively control, even in peace time. In return, they received shares, debenture stock, and cash to the nominal amount of £255,237 ; and although some of the shares had been re-issued to their own shareholders and stockholders on terms realizing less than par, yet they were able to improve their balance-sheet by an amount substantially in excess of the value of the asset sold —namely, £215,270, as against £179,617—while their own members had had an opportunity of increasing their holdings on favourable terms. The matter might now be looked upon as having been completed, and the former German interest entirely eliminated. One of the terms of the transaction was that the guarantee of the D.G.A. in respect of the principal and interest of the debenture stock should be cancelled ; and this had been done. In parting with this guarantee and with such a substantial portion of their security as the Austrian shares, the debenture holders gave up what they had always looked to as a material element of their security. But their interests were protected in part by the cancellation of the debenture stock taken over from the D.G.A., which reduced the debenture debt from £212,000 to £133,746. In order to strengthen the impaired security of the debenture holders, and to provide the Company with additional working capital, it was decided to issue 83,048 of the shares, and that their shareholders should have a prior right to subscribe—thus offering them an opportunity of retaining for themselves the benefit of the arrangements that had been made. Subject to their claims, the debenture stock holders had the right to apply. Many shareholders came in and applied freely ; and some of the debenture holders also received a moderate allotment. Of the proceeds of the issue, £43,082 had been invested in 5 p.ct. War Loan, in accordance with the Treasury stipulation, and stood in the names of the Trustees for the debenture stock holders of the Company, to reinforce the security for the debenture stock. In carrying out these transactions, the Board had been considerably aided by the courteous assistance of the Foreign Office, the Board of Trade officials, the Public Trustee's Department, and the officers of the High Court ; and they desired to make public their cordial acknowledgment of the broad-minded consideration they had met with. This aid had been invaluable ; and without it the carrying out of these difficult and complicated transactions would have been impossible. The issued capital of the Company now stood at £175,000 in £1 shares fully paid up, leaving 90,000 shares available for future issue, if required. These shares, however, could not be issued except by an extraordinary resolution of the Company. The ordinary shareholders, therefore, need not be under any apprehension of an unexpected issue of the shares. The debenture stock now stood at £133,746 ; and after the termination of the war, it was proposed to realize some of the War Loan, and



: WRIGHT'S :

GAS-HEATED OVEN

FURNACES

for Annealing, Hardening, and other Heat-Treatment of METALS. . . . .

VERY STRONGLY CONSTRUCTED.

LARGE RANGE of STANDARD SIZES.

UNIFORM TEMPERATURES SECURED.

ECONOMICAL GAS CONSUMPTION.

JOHN WRIGHT & Co.

ESSEX WORKS . . BIRMINGHAM.

invite tenders from the debenture stock holders, so that they might reduce the amount of the issue to (say) £100,000.

THE FINANCIAL POSITION.

As to the accounts, goodwill, trade marks, patents, &c., stood at a very small amount; and in the judgment of the Board, the values were much in excess of the figures shown in the balance-sheet. A careful study of the balance-sheet would, he thought, convince the proprietors of the intrinsic soundness of the Company's present position, and of its financial strength. The Company was now perhaps in a stronger and sounder position to meet competitive business than in the whole course of its history. On the debtor side of the balance-sheet, provision had been made by the sum of £15,993 for the payment of excess profits duty for the two years ended March 31, 1916. This question had been a very thorny one to the Company. Endeavours to adjust matters had involved numerous interviews with the officials, who had eventually been persuaded to take a modified view. This had enabled them to arrive at a standard which was far more satisfactory than at one time seemed probable. Turning to the profit and loss account, the profit on trading for the year, after providing for the items mentioned in the accounts, was £40,013, as compared with £26,427 for the previous year. This amount of profit, he might mention, had been arrived at without any aid from the Munitions Department, which, indeed, had involved some loss. With the dividend of £15,074 on shares in B. Cars, Ltd. (against £14,673 for the previous year), there was a total profit to be dealt with of £57,329. The items on the other side of the account were more or less on the usual scale. After providing for interest on debenture stock, depreciation, &c., the balance of net profit (subject to excess profits duty) was £30,512. This (with the balance of £2040 brought forward) permitted the Directors to recommend that a dividend of 5 p.ct. be declared, which would require £8750, less income tax, and leave a balance of £23,802 to be carried forward. As to the workpeople and staff, they had again looked after the families of those employees who had joined the forces; and the number of those who had done so exceeded a hundred. The few eligible men the authorities had permitted the Company to retain were mainly in a low medical category; but they were doing their work cheerfully and well.

THE TRADING OUTLOOK.

The present trading outlook of the Company, provided they received the supplies of raw materials contracted for, and could retain sufficient labour, appeared satisfactory—thanks to the able management of Mr. B. Cars. If, after the war, they were reasonably free from dumping of cheap foreign goods, the Company should have a successful future. In carrying out the work to which the Directors had set their hands, they looked for the whole-hearted support of the shareholders. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend of 5 p.ct.

Mr. CHARLES LOCK formally seconded the motion.

SERVICES ACKNOWLEDGED.

Mr. G. COLLIS congratulated the Chairman and his colleagues on the very successful way in which the negotiations had been carried through, and on the satisfactory balance-sheet that had been placed before the shareholders. The Company, he said, were exceedingly fortunate in possessing Directors who were able to grapple with such a difficult position as that with which the Board were faced after the outbreak of war. The profit was a very satisfactory one; and they were quite justified in looking forward to a continuance during the present year of the progress they had witnessed in the past.

The resolution was then carried unanimously.

Thereafter Mr. Robert Cars was re-elected a Director; and Messrs. Deloitte, Plender, Griffiths, and Co. were re-appointed Auditors.

The proceedings concluded with a hearty vote of thanks, on the proposition of Mr. COLLIS, to the Chairman, Directors, and staff.

OSWALDTWISTLE GAS UNDERTAKING.

Further particulars are now available of the results of the Oswaldtwistle gas undertaking for the last financial year, brief reference to which was contained in the "JOURNAL" last week [p. 167].

The gas made amounted to 83¾ million c.ft., being practically the same as in the previous year. The loss in domestic consumption due to the Summer Time Act had been made up principally by power users. The coal carbonized was 6673 tons, as against 7364 tons—a saving of 691 tons for the same output of gas. The make of gas per ton of coal carbonized was 12,550 c ft., which is the highest figure reached in the history of the undertaking. The cost of coal was £6379, an increase of £880; the average increase being slightly over 4s. per ton. The average net price received for gas was 2s. 7·6d. per 1000 c.ft., as against 2s. 3·8d. per 1000 c.ft., being an increase of 3·8d. The total revenue from gas amounted to £10,334, and from residuals to £4569, making, with miscellaneous revenue, a gross income of £15,578. Expenditure totalling £11,932, there remained a gross profit of £3646 (as against £2662), which, after payment of interest on loans and sinking fund charges, left a net profit of £1004—or £843 more than in 1916.

Mr. T. C. Usher (the Chairman of the Gas Committee), in his review of the year's work, said that coal supplies have been the cause of considerable anxiety; but they were able to overcome their difficulties with very creditable comparative results. The foresight of the Gas Committee, early in 1915, in sanctioning an installation of coal-elevating and conveying plant, together with stoking machinery, gave cause for congratulation. These labour-saving appliances had proved an invaluable boon. The Gas Committee were fully alive to the great future possibilities of the industry, and appreciated the necessity of having a means of cheap power, in local as well as national interests. They were willing to facilitate any scheme for the extension of the field of gas for power or industrial use.

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RETORT-HOUSE WORK AT GRANTON.

Mr. W. R. Herring's Report.

A brief reference was made in the "Journal" for the 3rd inst. (p. 28) to the suggestion by the Consulting Engineer (Mr. W. R. Herring) to the Edinburgh and Leith Gas Commissioners that, in return for higher pay, the retort-house men should do a greater amount of work. The report on this matter is now available, and from it the following particulars have been extracted.

Mr. Herring states that, since the Granton works were opened, the Commissioners have frequently dealt with the question of the work of the stokers in relation to their pay. In 1912, when they demanded some increase of wages, Mr. Herring and the Resident Engineer (Mr. Alexander Masterton) prepared a joint report, wherein they remarked that they did not know a gas-works in the country where the men had so little actual manual labour during their eight-hour shifts as at Granton; and, as they had so much spare time between the periods of work, it had occurred to them to suggest that the men might be disposed to do more work if they received higher remuneration. The scale of work and wages, as it existed in 1912, was carefully determined after protracted labour troubles at Granton. The Commissioners were conscious at the time of giving the men exceptionally favourable terms; but it had never since been thought fair to revise them. Records had been kept of the duration of actual work by the stokers, &c., from the moment they commence their rounds to the moment they sit down again; and it amounted to less than four out of the eight hours. The work is intermittent, and is allotted somewhat as follows: Two men charge 21 retorts per round hourly, and four men draw this number, which equals for each "charger" 10½ retorts in twenty-one minutes, and for each "drawer" 5¼ retorts in twenty-one minutes. After allowing, on an average, four minutes for sweeping-up, the "charger" has the remainder of the hour—viz., thirty-five minutes—for rest; but the "drawer" is sometimes employed a little longer, as he has to clear choked pipes, clean tar from shields, and scrape mouthpieces when required, which averages eight minutes per round, leaving him thirty-one minutes' rest out of each hour. The Engineers suggested that if the men would undertake to operate ninety-four retorts per shift, instead of eighty-four, their wages should be increased by 1s. 9d. per week, or 3d. per shift.

The schedule of times recently submitted by the men, Mr. Herring states, varies to some extent from the foregoing; but "time records, compiled with a specific object in view, may be reasonably looked upon as suspect." So far as the plant was concerned, and the method of using it, no change had taken place between 1912 and the present time, neither had any change taken place in the character of the coal used, nor in the period of charging and drawing. The only change that had been made had been in the introduction of new hands; and their inexperience may have added slightly to the period of labour.

Mr. Herring was quite satisfied that the large increase in the number of "stopped pipes" arose from this cause, and perhaps to some extent from want of close supervision over the new men by their respective foremen. The choking of the gas take-off pipes is inherent in all gas systems, and unless nipped in the bud becomes a very obstinate and frequent source of trouble. It depends primarily upon the operatives whether there are few or many stopped pipes. If, after the lighting up of a setting, a pipe is once neglected, and the "choke" is allowed to creep up the barrel, that pipe will be troublesome throughout the entire life of the retort, unless the retort is "set down," and a special gang of men employed to clean it from the top downwards.

After a careful perusal of the report of the meeting between the Commissioners and the representatives of the retort-house hands, Mr. Herring says that he sees no reason to alter his views as to the ability of the men to take on an additional amount of work for a proportionate amount of pay; and he suggests to the Commissioners that they should make offers to the men on these lines.

As reported on the 17th inst., the retort-men have decided that they are unable to do more work. So the question of their wages will form a part of the arbitration proceedings on the demand of the employees for an increase of 10s. per week.

WAGES QUESTION AT MANCHESTER.

In the "Journal" for July 10 (p. 74), reference was made to the decision of the Workmen's Special Committee of the Manchester Corporation to recommend the City Council to grant a war allowance of 9s. per week to all adult male employees whose wages or salaries amount to 26s. per week and upwards (up to £300), and 4s. 6d. for junior and female employees.

Mr. Fleming Eccles, the Organizing Secretary of the National Union of General Workers, writing to the Deputy Town Clerk, under date July 13, says he is instructed by his Executive to say "that the 9s. proposal cannot be accepted, and the men are fully justified in pressing for 12s. per week pre-war increase, for the reason that Corporation employees are generally paid at a lower standard than men engaged by private employers and limited companies." The communication goes on to say: "It is quite impossible to restrain the men much longer; and if you are now unable to give an immediate favourable reply, we have to request that the difference be at once referred to the Ministry of Labour for settlement." Six days later the Organizing Secretary wrote that "nothing less than an advance of 10s. 6d. per week, as and from April 11, will satisfy the workpeople on whose behalf we are entitled to act; and we feel it would be useless to appeal to the workpeople again for further patience."

At a meeting of the Workmen's Special Committee, held on July 20, it was decided that the men's application for 12s. per week pre-war

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increase should be referred to the Committee on Production for arbitration, the terms of reference to be as follows: "The Council, when the original application was made, had already granted a war allowance of 6s. 6d. per week, which was increased on July 4, 1917, to 9s. per week. The employees, through their Union, express dissatisfaction with the amount of this advance; so this Committee agree to the matter being referred to the Committee on Production for their opinion as to whether such advance is a reasonable one or otherwise."

The matter will, it is expected, be further discussed by the City Council at their monthly meeting to-morrow (Wednesday).

EDINBURGH GAS-WORKERS' ARBITRATION.

The National Union of Corporation Workers put forward, a few months ago, a claim on behalf of the Union members employed by the Edinburgh and Leith Gas Commissioners for an additional war bonus of 10s. per week. It was decided between the parties that the question should go to arbitration; and the Chief Industrial Commissioner recently appointed Sir Richard Lodge (Professor of History in the Edinburgh University, and a brother of Sir Oliver Lodge) as Arbitrator. The hearing took place at the Granton Gas-Works last Wednesday; and the following is the text of the award:

After careful consideration of the very clear and temperate statements put before me by the two parties, and having regard both to the altered value of money and to the various benefits, apart from wages, enjoyed by the permanent employees of the Commissioners, I have resolved to award to the workers concerned, including the gas-fitters and the meter readers, but not including the consumers' ledger clerks, an additional war bonus of 5s. per week, to be paid as and from the first pay-day in the current month. The additional war bonus hereby awarded is not to be taken into account in the calculation of payment for overtime or for work on Sundays and holidays.

Note.—While it is impossible, in existing circumstances, to forecast the future, and to fix a definite limit of time within which no demand for increased remuneration may be put forward, it is to be hoped that this award will give sufficiently substantial relief to render further demands unnecessary as long as the country can escape any abnormal economic disturbance.

Apropos of the consumers' ledger clerks, a vote by ballot was taken a week or two ago in the Treasurer's Department; and out of a total permanent staff not on war service of 40, only seven voted in favour of the Union looking after their interests—the remaining 33 preferring that the Commissioners should deal with salary and bonus questions on representations by the head of the department.

Mr. W. G. Weyman, the Secretary of the Henley-on-Thames Gas Company, who about a month ago joined the 2nd Reserve Cavalry, at Newbridge Barracks, Ireland, has been promoted to the rank of sergeant—the rank he held when he retired, a few years ago, from the Q.O.O.H.

MANSFIELD GAS PROFITS.

The accounts of the Mansfield Corporation Gas Committee for the year ended March 31 show that the total gross profit on the year's working has been £10,317, as compared with £10,426 in the previous year. After allowing for interest on loans (£5067) and contributions to sinking funds (£3524), a net profit on the year's working remains of £1648, as compared with £1876 last year.

The amount received from the sale of gas is about £870 less than in the previous year. Residuals have realized about £904 more. The expenditure on the manufacture of gas has been £1250 less, mainly owing to the decrease in production. Rates and taxes were nearly £1000 more, and outlay on war relief and war bonus £570 more.

An application was made to the Local Government Board for sanction to a further loan of £2000, to enable the balance due for gas-stoves to be paid; and this was duly received. Permission was also given to raise £3144, balance of a loan of £4000 previously sanctioned. The Committee have decided to pay over £750 to the general district rate, and to appropriate the balance of £898 to the reserve fund.

The Diesel Engine Users' Association intimate that the Inland Revenue Authorities have now agreed to increase the rate of depreciation upon Diesel engines by 10 p.ct. per annum; the increased allowance to remain in force for three years after the cessation of the war, when either the authorities or the taxpayer shall have the liberty to claim a revision.

A loss of nearly £9000 was made on last year's trading of the Walsall Corporation Electricity Department. Asked at a meeting of the Town Council to account for this state of affairs, the Chairman of the Electricity Committee said the concern had gone through an extremely difficult and trying time. It had been made very plain on several occasions that a loss was certain to result during the transition stage from the old works to the new works; and events had borne out this forecast. On the top of this, however, the concern sustained a loss which was altogether unexpected, and which was caused by the action of the Ministry of Munitions in commandeering plant which was intended for the new power station. The consequence was that, instead of the new works being brought into operation early in 1915, it was not until Feb. 10 this year that any plant was available for use; and the loss incurred was almost entirely due to this cause. He agreed that the outlook would be a serious one for ratepayers if they had to find the £9000; but he considered they had a strong claim against the Ministry of Munitions for compensation—it had already been sent in. It was hoped that early in September the Committee would have the new works in full operation; and they would then close the old works, at which the costs of generating current were very heavy.

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STUDY OF GAS ENGINEERING AND MANUFACTURE.

Battersea Polytechnic Course.

The desirability has been realized for some time past by the Governors of the Battersea Polytechnic of instituting a full-time course of training in gas engineering and manufacture, to prepare as engineers or chemists youths who desire to enter the gas industry. In view of the developments that are taking place in gas manufacture and allied industries, the Governors feel that this step should be no longer delayed; and they have therefore decided to start a three-year full-time course for youths of 16 or 17 years of age.

The scheme of instruction has been drawn up in co-operation with the representatives of some of the larger gas companies, who have offered facilities for students to visit their works, and study the various operations connected with the gas industry as carried on under commercial conditions. The aim of the course is to give, primarily, a thorough training in the general principles of chemistry, with special reference to the requirements of the gas industry, including the economic aspect of manufacturing chemistry, together with such knowledge of engineering as shall make the student familiar with the fundamental principles of engineering construction and design, and with the operation of common engineering and chemical plant. The course of study will therefore embrace inorganic chemistry, organic chemistry, physical chemistry, physics, mathematics, engineering, gas manufacture, technical analysis, industrial economics, and German.

Students who work satisfactorily through the course, and pass the Polytechnic examinations, are eligible for the award of the Polytechnic diploma in "Gas Engineering and Manufacture." Students who have passed the matriculation examination prior to commencing the course may, in addition, work for the B.Sc. pass or honours degree in "Chemistry," and, if successful in this, for the associateship of the Institute of Chemistry later. The course of training is open to youths of 16 or 17 years of age who have had a good general education.

The Polytechnic session comprises about 38 weeks, extending from the middle of September to the middle of July. The next session begins on Sept. 25. The fee for the full-time course of work is £13 13s. per session, or £5 per term.

The Principal of the Polytechnic is Dr. F. H. Newman, M.A.; and the Head of the Department of Applied Chemistry is Mr. J. Wilson, M.Sc., F.I.C.

Mr. J. A. Taylor, of Bradford, and son of a well-known Batley magistrate and public man, was found dead in his bed last week with a rubber tube lying near, connected with the gas-bracket, which was turned on. At the inquest, the jury found that death was caused by coal-gas inhalation, while in an unsound mental condition brought on by worry.

GAS-WORKS AND ALLOTMENT GARDENING IN AMERICA.

The American nation, as a whole, is at the present time strongly impressed with the importance of preparedness, probably to some extent on account of the fact that in respect to many important features incidental to the war the British nation has proved to be a year or more behindhand, and that the consequent loss of life, property, and prestige is enormous. Our belated endeavours to increase the home production of cereals, fruit, and vegetables are a case in point. They are not only advocating increased production, but encouraging all methods of bottling and preserving for winter use. As has already been recorded in the "Journal," a national canning campaign is being promoted by the National Commercial Gas Association, one item in which is the issue of appropriate folders each month, describing the methods of preserving current crops; and this enterprise will bring the subject to the prominent notice of gas undertakings.

The advent of war has given a great impetus to the community garden idea among gas companies, says the "American Gas Engineering Journal." Hitherto regarded only as a branch of employees welfare, the backyard vegetable garden is now recognized as a national asset. It will help the nation by releasing wholesale supplies for the needs of the allies, and will aid the individual in meeting the higher cost of living and increased taxation that is inevitable. All gas companies should therefore get behind the home garden idea. A few examples of activity in this direction may be quoted. The Rochester Railway and Light Company offer several acres of spare land, to be assigned to employees in order of request (suitable forms for which have been provided) in plots of 50 ft. square, or smaller if preferred, and will furnish ploughing, fertilizers, and seed at cost. In order to facilitate adequate cultivation, the Company are adjusting working hours, to enable employees to be at liberty earlier in the afternoons. A large shareholder in the Portland Gas Light Company has placed 10 acres of land at the disposal of the staff; and they have organized a "Potato Club," which includes several young women, and are planting this year one half of the area with vegetables—utilizing the experience of a few members that happen to have been brought up on farms. They propose to devote spare time and holidays to an extensive programme, including the rearing of pigs. The Twin State Gas and Electric Company at Burlington, Vt., are ploughing 7 acres of land, and planting it with potatoes. The Attleboro Gas Company (Mass.) have offered the use of a large tract of land for allotment cultivation, in common with other owners in that district. Farm lands in which the Denver Gas and Light Company are interested will produce at least 180 tons of potatoes this season, the whole of which will be offered, in the first instance, to the employees at bare production cost, which is estimated to be less than ¾d. per pound.

The "Frankfurter Zeitung" learns that in a few weeks gas consumption in Germany will be regulated and gas tickets issued.

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MANCHESTER.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 30.

Inquiry for pitch over next season continues good, and it is reported that 44s. per ton net in bulk at makers' works has been paid. Creosote is unaltered at 4¼d. per gallon net in bulk; but the recent Government order is restricting business. Solvent naphtha is steady at 2s. 2d. to 2s. 3d. per gallon net at makers' works. There is no change to record in other tar products.

Steady business is being done in sulphate of ammonia at the prices fixed by the Government.

Tar Products in the Provinces.

July 30

There is nothing fresh to report concerning the markets for tar products.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. to 24s. 6d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Gas Complaints at Shipley.—At the last meeting of the Shipley District Council, the Gas Committee reported the receipt of a number of complaints of increases in gas consumption for the half year ended June 30, to an extent which the consumers could not understand; and it was suggested that the accounts were inaccurate. The Committee had considered the matter at length. The heating value of the gas, it seemed, had been somewhat depreciated, in consequence of the extraction of benzol. There had also been some depreciation in the quality of the gas owing to a breakdown of part of the plant at the works. There might also be defects in the meters. The Committee had instructed that the meters be tested, and, if proved inaccurate, that an allowance be made on the accounts. Otherwise the Council were bound to charge for the consumption indicated by the meters. The Chairman of the Council expressed relief at hearing a full and clear explanation of this matter. There was no doubt there had been a considerable increase in consumption; and this was not altogether the fault of the Committee. The Committee thought there would be no further cause for complaint.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is quiet. In the steam coal trade, best Northumbrians are fairly steady at 33s. per ton f.o.b.; second-class steams are dull at about 25s. 6d.; and steam smalls are plentiful at from 18s. 6d. to 20s. 6d. In the gas coal trade, the demand shows a steady increase, and Durham descriptions upon the whole are better situated than Northumbrian, for the latter depend more on the export trade. Best Durham gas coal is about 25s. per ton f.o.b.; second-class gas qualities are from about 24s. to 24s. 6d.; and for "Wear specials" the current quotation is from 29s. to 30s. The home consumption is now steadily increasing; but there appears to be at present a more ample supply. Little is just now doing in forward contracts; but some seem to have been arranged for a few months ahead; and on these deliveries have commenced. The full demand for coal for the controlled establishments helps to take up well the production of Durham coal, and lessens the quantity available for export. Freight on gas coal is firm; and is indicated as from 15s. to 15s. 6d., Tyne to London. Gas coke is in fair inquiry at from 30s. 6d. to 32s. 6d. per ton f.o.b.

Salaries of Manchester Gas Officials.

At the last meeting of the Manchester Gas Committee, several officials were recommended for advances of salary, consequent on rearrangement of the departmental work as a result of the death of Mr. T. Harrison, the Chief Deposits Clerk. It is proposed that Mr. F. J. Caldecott, Chief Rental Clerk (who has been in the service nearly 40 years), be given control of the Deposits Office, and that his salary be advanced from £410 to £450 per annum. Mr. W. S. Brocklebank, Principal Assistant to the Chief Rental Clerk (22 years' service), from £215 to £235. Mr. Geo. Hodson, Manager of the Gas-Stove Show-Rooms (39 years), from £250 to £270. Mr. Thos. Hill, Senior Assistant in the Deposits Office (25 years, and at present on war service), from £175 to £195, to date from his discharge from the army. Mr. Thos. Bannister, now acting as Senior Assistant in the Deposits Office (22 years), £163 to £180. Mr. Henry Sibbles, Assistant Receiver in the Deposits Office (21 years), £163 to £180. Mr. H. C. Atkinson, Assistant Receiver in the Deposits Office (20 years, and at present a Captain in the R.F.A.), from £158 to £180, to date from his discharge from the army. The Gas Committee point out that the late Mr. Harrison had a salary of £350 per annum; and the total of the advance of salaries and wages is £218 per annum. But as £83 is withheld until the men interested are discharged from the army, the net saving at the moment is £214. The ultimate saving will therefore be £131 per annum. It is thought only right, says the minute of the Gas Committee on the subject, that the men in the army should have their interests protected, as they would in all probability have received the increases mentioned had they been now in the Committee's service.

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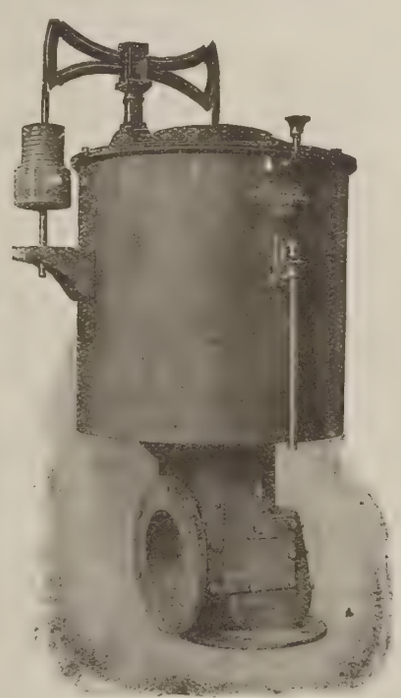

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Coal Distribution Scheme.

With regard to the scheme of the Coal Controller for the equal distribution of next winter's coal, to which reference is made in our editorial columns to-day, it may be mentioned that the scale of rations between Oct. 1 and March 31 is fixed as follows:

Size of House.	Coal per Week.
3-5 rooms	Up to 2 cwt.
6-7 rooms	Up to 4 cwt.
8-9 rooms	Up to 5 cwt.
10-12 rooms	Up to 6 cwt.
Over 12 rooms	Up to 8 cwt.

From April 1 to Sept. 30 the allowance will be half the winter ration.

Wages Award at Plymouth Gas-Works.

The award was published last week of Mr. A. J. David, K.C., who sat as arbitrator on behalf of the Government in reference to the claim of certain workmen of the Plymouth Gas Company for an advance of wages. The case was argued on the 6th inst.; the claim of the workmen being supported by the Dockers' Union, which a number of the workmen have recently joined. Mr. P. S. Hoyte (Engineer and Manager), Mr. Geo. H. Bolton (Secretary), and Mr. J. W. Walters (Works Foreman) represented the Company; and two of the Union officials, together with two of the workmen, appeared in support of the men's case. On behalf of the men, the demand was: (1) That all present rates should be consolidated and regarded as standard wages; and (2) that a further increase of 8s. a week should be given to adults, and a further sum of 4s. a week to juniors, to be regarded as conditional wages. Mr. David by his award decided: (1) That the present rates shall not be consolidated and regarded as standard wages; and (2) that an increase be made in the war bonus of 2s. per week for adults, and 1s. per week for youths under 21 years of age, to continue for the period of the war. The award takes effect from the date of the hearing. Some of the workmen were not parties to the application, but continue members of the co-partnership, one of the conditions of which is that they shall not join a trade union. Under the award, however, all share alike in the increased war bonus.

Darwen Gas and Electricity Departments Contrasted.

In a review of the accounts of the Darwen Corporation for the past financial year, Mr. S. Crook (the Borough Treasurer) says twelve months ago attention was drawn to the high prices ruling for coal and materials generally. "This condition has," he says, "been accentuated during the year; and, coupled with the demands for increased wages and the scarcity of labour, some of the Corporation departments have passed through very trying stages." Mr. Crook's survey of the gas undertaking reads: The year's working of the Gas Department resulted in a loss of £1029. War separation allowances paid to the dependants of gas-works employees cost £202, making a total deficit of £1232 for the year. At the commencement of the year there was an undisposed-of balance of profit amounting to £2161. The profit carried forward is thus reduced to £929. The sales of gas, in round figures, amounted to 169,766 000 c.ft., as compared with 187,530,000 c.ft. for the previous year, or a decrease of 17,764,000 c.ft. The loss for the year on the Electricity Department amounted to £2695, and the war separation allowances to £194. The loss brought forward at the commencement of the year was £385. Deducting from these sums the grant-in-aid made from the general district rate during the year, it will be seen that there is an adverse balance against the department of £2631. The capital expenditure on the electricity undertaking now amounts to £81,605. The department has received aid through the general district fund since its inception of £2635, and paid in aid of the rates at various times sums amounting to £3270.

Tideswell Gas Company.—The annual meeting of the Company was held on Wednesday last, when the Chairman (Mr. T. Cooper), in moving the adoption of the annual report, said the undertaking, like many others, had been badly hit; but they were in a position to declare a dividend of 5 p.ct. The price of gas was increased 6d. per 1000 c.ft.

Plumbers' Holidays with Pay at Bury.—At the last meeting of the Bury (Lancs.) Gas Committee, a letter was read from the local Secretary of the Operative Plumbers' Association, making application, on behalf of their members, for four days' holiday annually with pay. It was resolved that the application be granted, and that it apply to all the men employed at the gas-works.

The Alleged Gas-Works Nuisance at York.—At a meeting of the York Corporation Health Committee, the Town Clerk stated that the Council had decided that the Committee should report further upon the nuisance at the gas-works to an early meeting of the Council. It was agreed that notice should be served upon the Company requiring them within three months to abate the nuisance, failing which proceedings should be instituted against them.

Exhauster Governors at the Tottenham Gas-Works.—In our issue of the 12th ult. reference was made (when reporting the visit of the Institution of Gas Engineers to the Tottenham Gas-Works) to the turbo-exhausters of the British Thomson-Houston Company. It was said they were fitted with "Donkin" governors. This statement was not correct; and Messrs. George Waller and Son, Ltd., ask us to state that the governors fitted to the machines are "Waller" governors, supplied by the firm.

Chelmsford Gas-Works Transfer.—The Gas Committee of the Chelmsford Town Council state that Messrs. Torr, Durnford, & Co. have now intimated that the Chelmsford Gas Company are prepared to accept payment of £1090 in settlement of the sum of £1138, incurred by the Company for costs in connection with the transfer of the gas undertaking. Messrs. Torr, Durnford, & Co. have already been informed that the Corporation are willing to settle the matter upon payment of the sum of £1050; and the Gas Committee have directed the Town Clerk to confer again with them on the subject.

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WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 3, Queen Street MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Birkenhead and Meter-Rents.—There was a long discussion in the Birkenhead Town Council over a resolution of the Gas Committee to the effect that, as from July 1, a quarterly rental should be charged for the hire of gas-meters (other than prepayment meters), according to size. It was pointed out by Alderman M'Gaul, the Chairman of the Committee, that the suggestion was not an innovation, as meter-rents were payable until a few years ago. A proposal to refer the matter back was lost by twelve votes to thirteen; and the minutes were adopted.

Wages at Burton-on-Trent.—The Burton Town Council have agreed to a recommendation of the General Purposes Committee, that additional war bonuses be granted as follows: Able-bodied men, 5s. per week; youths between 17 and 21 years, 3s.; youths up to 17 years, 2s.; women, 3s.; girls between 15 and 21 years, 2s.; and that the first payment of the increased bonuses be made on the first pay day after the Council adopt the proposals. The foregoing not to apply to the men excepted at the arbitration in March, 1916. As to the staff, the war bonus of 5 p.c. now paid is increased to 7½ p.c. on salaries up to, and including, £140 per annum; and a bonus of 5 p.c. is to be paid on salaries over £140 and up to £200 in the case of all married men. This does not apply to the Education Committee staff, whose case is being dealt with by that Committee. A majority of the men regard the decision arrived at as an unsatisfactory one.

Wages Arbitration at Todmorden.—The Todmorden Corporation employees' application for increased wages is to be referred to arbitration; the Corporation's offer having been refused. This offer, which holds good if the men care to accept it, is an additional war bonus of 2s. 6d. per week to all employees (other than carters and employees of the Education Department) earning less than £150 per annum; the bonus to commence from the first pay day in June last, and to continue to the expiry of six months after the end of the war. The offer applies to whole-time regular employees; a separate additional bonus being offered for casual or part-time workmen.

Losses at Accrington.—A meeting of the members of the Accrington Gas and Water Board will be held early in August, to consider the statement of accounts for the past year, and what steps to take to meet the loss incurred on the gas undertaking. Locally, the Accrington consumers are contrasting the position with that of the neighbouring district of Oswaldtwistle, where, with gas at 2s. 9d. per 1000 c.ft., a profit of over £1000 was made last year [*ante*, p. 167]. The price of gas at Accrington is 3s. 1½d. per 1000 c.ft.; but, in justice to them, it has always to be remembered that the Accrington Gas and Water Board bear a heavy burden in the way of repayments and annuities on a huge purchase price, with which the Oswaldtwistle undertaking is not saddled.

STOCK MARKET REPORT.

AFTER the long continued attitude of firmness and unimpaired cheerfulness which has been the pleasing characteristic of the Stock Exchange for a good many weeks past, a decided change in the general position supervened last week. As a set-off against the satisfactory operations upon our Western front came the sad news from the Eastern battlefields, showing to how great an extent the poisonous corruption of Russian troops by traitorous pacifists had spread. Another factor to influence markets adversely was the 650 million vote of credit which set people thinking, and frightened some of them when the late Chancellor hinted at an increase in the income-tax. Markets in this way underwent a *volte face*; and those that had been soaring the highest, of course, had the farthest to fall.

The gilt-edged market was one of them. Home Government issues eased-down, with the exception of the tax-free 4 p.ct War Loan, and Indian and Colonial accompanied them. Home Rails slacked-off persistently, and there was no difficulty in finding stock, if anybody wanted it. Americans were dull and neglected, and Argentines were only middling, though the last figures were not the worst of the week. South Africans had a dull time.

The Foreign Market was not exempt from prevailing depression, though there were one or two brighter spots here and there. Russians, of course, were prominently affected, though there was a momentary pause in their downward course, and Brazilians were set-back by adverse exchange. But Dutch, Scandinavian, and Chinese issues were firm.

Business in the Gas Market made no recovery in point of volume; the aggregate of transactions bulking no larger than the array the week before. But it was much more fairly distributed throughout the list, quite a good many undertakings changing hands which but seldom make a public appearance. The general tone was steady; prices showing hardly any change in the bargains marked, and quotations only varying for *ex div.* adjustment. Gas Light and Coke announce a full statutory dividend of £3 14s. 8d. p.ct. per annum, and Tottenham District similar dividends at the rate of 5½ p.ct. on the "A" stock and 4 p.ct. on the "B" stock. The dividends paid six months ago were 5 p ct. and 3½ p.ct. respectively.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 81, Croydon "B" and "C" 173½, 174, ditto "D" 93⅜, Gas Light ordinary 71, 71½, Hornsey 110½, Ilford "A" and "C" 94, Imperial Continental 79⅛, 80, Monte Video 8⅛, South Metropolitan 73½, 75. On Tuesday, European £12 3s. 3d., £12 5s., Gas Light ordinary, 69, 71¼, ditto preference 73, ditto debenture 56¼. South Metropolitan 74¼, 74½, 75. On Wednesday, Barnet "D" 100½, 101, Croydon "D" 93½, ditto 4 p.ct. debenture 75, Gas Light ordinary 69, 70, 71, ditto preference 73, 73½, 74, ditto debenture 56⅝, Imperial Continental 80, Primitiva debenture 79, South Metropolitan 73½, 74, 74¾, Southgate 10 p.ct. 142, 142½. On Thursday, Bombay 5, Brentford "B" 76, Bournemouth preference, 98⅜, Commercial 4 p.ct. 72½, 73, Gas Light ordinary 69¾, ditto maximum 56½, ditto debenture 56¼, Guildford 90½, 91, Primitiva debenture (1911) 59½, 60, South Metropolitan 74, 74½. On Friday, Continental Union 39½, Imperial Continental 79⅛, Primitiva 39s.

The Bank rate is 5p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex. Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	,,	April 8	2⅔	5⅓%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅛	4¼ -5¼	5
50,000	10	Feb. 26	16	15/-	Bourne-mouth Gas and Water: 10 p.c.	29—30	24—26	..
383,110	10	,,	7	7/-	Bourne-mouth Gas and Water: B 7 p.c.	15—15½	10⅜—11¼	..
115,000	10	,,	6	6/.	Bourne-mouth Gas and Water: Pref. 6 p.c.	13½—14	9¼—9⅞	9⅜
159,740	—	—	—	4%	Bourne-mouth Gas and Water: 4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅓%	Brentford A Consolid.	261—266	79—82	81
734,920	,,	,,	11	4⅛%	Do. B New	204—209	77—80	76
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33 -34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	54—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	2½—3	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½ 80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72—74	72½—73
560 000	,,	,,	5½	46/8	Do. 3½ p c. do.	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39⅛
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	60—62	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	170—180	173½—174
	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½—18	11⅛—12½*	12/3/8—12/5/-
16,313,430	Stk	Feb. 10	4/17/4	37/4	Gas Light and Coke: 4 p.c. Ord.	98—102	67—69*	69—71½
2,600,000	,,	,,	3⅛	3⅛%	Gas Light and Coke: 3⅛ p.c. max.	76—79	54—56*	56½
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	70—72*	73—74
4,674,850	,,	June 11	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	55—57	56¼—56⅝
130,000	,,	,,	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16¼—16½	7⅛—8⅛	..
86,600	—	—	—	9⅛%	Hornsey 7 p.c.	..	120—130	110½
131,000	Stk.	Mar. 12	7⅛	7⅛%	Ilford A and C.	151—154	95—100	94
65,780	,,	,,	6⅜	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	79½—80
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	82—83	..
					Liverpool 5 p.c. Ord. B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅜—4*	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8¼
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'd Con.	98⅝—99½	70½—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	71—73	..
55,940	10	Feb. 26	7,14,0	7/0	North Middlesex 7 p.c.	14 -15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅜	2—3	..
60.000	50	Feb. 26	13	12%	Portsea, Island B	128—131	92—97	..
100,000	50	,,	12	11%	Do. C	118—121	85—90	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅞ -2⅛	39/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	2⅜—3½	..
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—80	79
—	—	—	—	4%	Do. ,, ,, 1911	..	..	59½—60
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—61	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½ -11	7⅜ -8¼	..
125,000	50	July 1	5	5%	San Paulo 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Sheffield B	222—224	178—182	..
523 500	,,	,,	10	10%	Sheffield C	220—222		
90,000	10	May 28	9	6/-	South African.	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	73½—75
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	..
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	7 :—78	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135,000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham District: A 5 p.c.	135—138	95—100	..
782,275	,,	,,	6	3⅛%	Tottenham District: B 3½ p.c.	115—117	68—73	..
181,255	,,	June 26	4	4%	Tottenham District: 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c.	151—156	114—119	..
255,686	,,	,,	6⅝	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c.	110—115	86—91	..
852,000	,,	,,	6⅛	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6⅝	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

Gas-Fired Soft-Metal Furnaces.

A general outline of the more important soft-metal operations to which gas is applicable (exclusive of the melting and remelting of such metals as applied more particularly to the printers and allied trades), such as the making of Babbitt metals and white bronzes, salvage of pure metal from dross, tin coating, die casting, soldering, &c., is discussed in the "American Gas Engineering Journal," by Mr. Gilbert C. Shadwell. A list of soft-metal compounds as used by makers of table and fancy ware, lamps, and numerous small goods, in machine and railway shops, galvanizers, plumbers, &c., is given in full detail. The metals that can be melted over fan or blast gas burners are stated to be aluminium, antimony, bismuth, copper, lead, tin, and zinc. Typical illustrations of furnaces are included. Die casting is a comparatively modern method of producing castings in soft brass, or compounds of lower melting point that do not require to be machined.

A Leaving Certificate Refused.—At the Halifax Munitions Tribunal last Wednesday, John Hunt, a Corporation gas works labourer, sought a leaving certificate; his complaint being insufficient payment. It was said his wages were 33s. per 49½-hour week, which, according to Mr. G. Kaye (of the Workers' Union), representing the man, was lower than the payment of labourers in other employment in the town. It was stated for the Corporation that it had just been decided to advance their labourers' wages to 35s. per week. In view of this, the tribunal refused the certificate.

Composition and Quality of Gas.—At the quarterly meeting of the Executive of the Urban District Councils Associations, a letter was read from the Board of Trade asking the Association to nominate a technical representative to attend a conference with the Director of Fuel Research, Sir G. T. Beilby, F.R.S., in regard to the most suitable composition and quality of gas, and the minimum pressure at which it could be generally supplied, having regard to the desirability of economizing coal, the recovery of bye-products, and the purposes for which gas is now used. The Secretary was requested to see the Board of Trade and ascertain whether the invitation was addressed to the Association as representing urban councils supplying gas or as representing consumers of gas, and whether the expert should be a gas engineer or a chemist.

Moving a Testing-Station.—At the end of 1916, the London County Council decided to dispose of the site of the Westminster Gas-Meter Testing Station; and the place was closed last month. The Council have arranged, as a temporary measure, for the adaptation of a portion of the Harrow Road Weights and Measures Office for use as a gas-meter testing office, and for the transfer of the larger portion of the plant at the Westminster office. The removal of the plant involved some difficulty. Much of it is very heavy, and required the most careful handling; the essential parts being quite fragile. The ordinary testing work was, however, carried on without interruption.

Ossett Corporation Gas Charges.—The Shitlington Council lately received information from the Ossett Corportion of the advance in the price of gas by 3d. per 1000 c.ft., from the end-of-June reading of the meters. The new charge is 3s. 6d. by ordinary and 4s. 2d. by slot meters. The local Council vigorously protested against the increase, on the grounds of poor quality gas and that the district was already paying 3d. per 1000 c.ft. more than Ossett, Horbury, and Crigglestone. It was mentioned, in regard to the latter point, that Shitlington would be on the same level as the other places, if its consumption increased to a certain total. The Chairman said that was the reason Ossett gave; but Ossett knew very well the district could never reach this total. The view was generally voiced that at the end of the war the gas question must be looked into, and something done—Dewsbury being in mind. The meeting passed a resolution of protest.

We are informed that the business of Ernst Hildebrandt, Ltd., of Ravensbury Terrace, Earlsfield, S.W., has now passed into British hands, and that the name has, with the permission of the Board of Trade, been changed to the Clay Ring Company, Limited.

Thirty-six applications have been received for the post of Engineer and Manager of the Airdrie Corporation Gas-Works, rendered vacant through the appointment of Mr. J. W. M'Lusky to Blackburn. A provisional short list has been drawn up by the Committee; and it is intended that the candidates on it shall be interviewed. The Town Council meet on Thursday night; but it is expected that a special meeting will have to be held afterwards for the purpose of making the appointment.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Seaford Gas Company. Applications by Aug. 8.
GAS MANAGER. Sounthorpe Urban District Council. Applications by Aug. 9.
MANAGER AND BUYER (Glass). No. 6331.
CHEMIST. Stretford Gas Company.
SALES MANAGER. Aldershot Gas, Water, and District Lighting Company.
MECHANIC. Kettering Gas-Works.
GAS FITTER. Frome Gas-Works.
STOKERS. Milton Regis Gas-Works.

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GAS MANTLES. Haseltine, Lake, & Co., 28, Southampton Buildings, Chancery Lane, W.C.

Meetings.

SOUTH METROPOLITAN GAS COMPANY. Cannon Street Hotel, Aug. 15, Two o'clock.
SOUTH SUBURBAN GAS COMPANY. Cannon Street Hotel, Aug. 10, Twelve o'clock.

TENDERS FOR—

Coal.

Burnley Gas Department.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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See Illustrated Advertisement, May 15, p. 268.

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXIX., No. 2830.] TUESDAY, AUGUST 7, 1917. [69TH YEAR.

EDITORIAL NOTES.

More Tar an Urgent Need.

TAR is the urgent requirement of the day. Comment was made last week upon the appeal of the Ministry of Munitions to gas engineers to apply themselves to realizing the maximum coal-gas output, and to shut-down their water-gas plants at once, except in so far as their use is necessary for meeting any excess demand for gas beyond the capacity of the retort-settings. It was also then mentioned that the Coal Controller had promised to see that gas undertakings were amply supplied with coal. The Ministry of Munitions require the maximum production of tar, of as good quality as possible. We cannot understand why this order has not come earlier, inasmuch as it is obvious that the home production of every conceivable material contained in coal is most necessary to the country in time of war. The National Gas Council have been approached by the Ministry of Munitions in regard to the matter; and the Executive Committee (with a number of gas engineers and managers who have been co-opted to form a Consultative Committee) are to work in conjunction with the Ministry in connection with it. Two suggestions are put forward: (1) The one already referred to, of shutting-down all water-gas making plants save for meeting demands in excess of coal-gas capacity; and (2) to increase the yield of tar by a suitable reduction in the temperatures at which the coal is carbonized. There are numerous difficulties to be encountered; but it is hoped that all undertakings will consider how best to augment their output of tar. Already the days are gradually drawing-in; and every day brings us nearer winter, when retort temperatures will again have to be raised in many cases and the maximum production secured from every ton of coal handled.

Board of Fuel Research Inquiry.

THE preliminaries are under way with regard to the preparation of material and evidence to be submitted to the Board of Fuel Research in connection with the inquiry to be held by them as to the composition of town gas. A report is being prepared for the Board by the Institution of Gas Engineers, who are acting in the matter in collaboration with the National Gas Council. It is understood that every section of the gas industry will be consulted before the report referred to is presented; it being appreciated that not only the manufacturing but the consumers' side of the subject should be considered. From a paragraph that appeared in the "JOURNAL" last week [p. 210], it will be gathered that local authority associations are also being consulted; and it may be presumed that large consumers—such as the railway companies—will likewise be invited to give evidence. Any way, from what is already known as to the steps that are being taken by the Board, it is clear that the inquiry will extend to all the interests concerned.

Ratio of Bye-Products Output to Gas Make.

BY the reference made to the Fuel Research Board by the Board of Trade and other Government Departments concerned, as to the most suitable quality of town gas to be generally supplied, they are very properly requested, among other considerations, to have regard to the adequate recovery of bye-products. The secondary products of coal carbonization are an important element in the economy of the gas industry, and therefore in the fixing of the price at which undertakings are able to put gas at the service of users. This being so, the "adequacy" of the recovery of bye-products is only part of the question. Consideration should extend to the commercial position of each individual product—not only under current conditions and not in relation to past circumstances, but with a view to prospective conditions, some of which have been hurried into great prominence by the requirements of the war or forced by the war, not only at home, but in Germany and other countries. Aligned with this prospective position is the matter of the economical development of the secondary products business within the industry; and in this connection there may be earnestly commended to the Fuel Research Board the decision of the Joint Committee of both Houses of Parliament in the session of 1912 [see "JOURNAL" for Dec. 17, 1912, and the Blue Book issued in 1913] regarding freedom in the working-up of secondary products, and the subsequent abuse of the recommendation, at the instance of the chemical manufacturers, by certain Parliamentary Committees and the Private Bill Authorities.

The work of the Fuel Research Board is directed mainly to the question of fuel economy; and fuel economy must take into consideration the best utilization not only of coal but of coke, with the view of conserving the former. This has a bearing upon the point it is desired to make regarding secondary products. It is certain that there will be after the war a greatly increased use of gas, and that this will enlarge the yield of the secondary products. It becomes a question therefore whether, in view of the prospects of the bye-products markets, it will not be better, in the cause of an ultimate economy, to go as far as is practically and reasonably possible in producing, by the carbonization of coal and the gasification of coke, a mixed gas of approxmately the composition that may be resolved upon, and so to that extent reduce the ratio of the output of secondary products to gas. It is not intended here to make any categorical pronouncement on the subject, but merely to put forward the point as one that should be considered as being important in the determination of the general question. It is, however, perfectly obvious that, although the Fuel Research Board may—quite apart from the inquiry in which we are more immediately concerned—eventually make recommendations which will help to prevent the present wasteful use of bituminous coal, and bring gas and coke into much more extensive use, there can be no acceptance of the frequently uttered generalizations as to the complete prohibition of the use of such coal, as the economical supply of gas and coke is in part governed by the points at which the supply of the whole of the secondary products is counterbalanced by the demand, and paying values are maintained.

Take in the first place coke. Through the shortage of supplies of coal due to distribution difficulties, coke has been having a good time; and there is not the slightest doubt that the extensive use that has been made of it during the war for steam-raising, and to a smaller extent for steam-driven road vehicles, will ensure a considerably larger demand in the future than was the case before the war, when disheartening accumulations of coke were seen in many gas-works yards. The prescription of a gas which would permit of the more general use of a percentage of blue water gas or lightly carburetted water gas would, at the same time, do something to reduce not only the output of coke in relation to gas made, but would absorb a proportion of that produced. It is admitted that the thermal efficiency of coke gasification does not nearly approach that of coal carbonization. Taking the thermal value of a good coke as 14,000 B.Th.U. per lb., this would be equal to 31,360,000 B.Th.U. per ton; gasifying the ton, and realizing (say) 60,000 c.ft. of 300 B.Th.U. gas, is equal to 18,000,000 B.Th.U, or about

57 p.ct. of the heat value of the coke. Yet there are economic advantages which fully justify the thermal expenditure. Of course, the prohibition of the use of bituminous coal for (say) steam-raising and industrial purposes would—if generally feasible—at once provide a certain market in industrial centres for large outputs of coke. But it is not all areas that are well-favoured with fuel-consuming industries. The saturation point for the domestic consumption of coke would soon be reached, as in the household choice between gas and coke for cooking and heating would—excepting in large establishments for hot-water supply—generally result in gas receiving the preference. Prohibition of the use of bituminous coal for domestic purposes has not yet been brought within the range of practical politics. The possibility may grow with the economic development of the gas industry; but the time is not yet. Nothing definite can at present be said as to low-temperature carbonization; but the prospects dwindle the more it is investigated from both the technical and the commercial points of view. The fact that the systems are approaching the higher temperatures employed in the gas industry speaks volumes.

Regarding the other bye-products, the sources of supply are not confined to the gas industry. With the development of the trade of this country, the demand for metallurgical coke will grow; the beehive ovens are threatened with extinction; and the bye-product recovery ones are bound anyway to be considerably extended, with the result that the productions of tar, benzol, and sulphate of ammonia will be largely supplemented. Possibly in relation to tar and sulphate there are reasons for endeavouring to reduce the ratio of their output to the expected future larger output of gas by gasifying coke to the extent that prudence permits, while seeing to it that the tar and sulphate made are not sacrificed in any way in quality or quantity in relation to the quality and quantity of the coal carbonized. There is an enormous field for all the products of tar. But we must look for a considerable increase in its production with the hoped-for expansion of the use of gas, and the greater requirement of metallurgical coke; for although we speak of the ratio of the output of secondary products to the output of gas being lowered, this does not mean that, with the expansion of gas consumption, the quantity of coal carbonized is not going to grow considerably. For dehydrated tar, there is a limit to demand for road and other purposes. For pitch there are bounds to its service, and the development of its home use for briquette making is not greatly encouraged—in fact, it is recognized that commercial success is largely governed by the price of other fuels. Anyway, though the industry is allowed, by the more general gasification of coke, to produce a mixed gas of excellent combustible character, and giving a high flame temperature, there will be no lack of tar (we are speaking of after the war) for all requirements. Then there is sulphate of ammonia. In now being through the war well disposed of at home, it is in an unprecedented condition. After the war, its output will certainly increase. But both at home and in the markets abroad, where the greater part of the British output formerly found custom, it will, on the return of peace, be subjected to heavy competition from other fertilizers, including those which depend upon the utilization of atmospheric nitrogen. The war has been a compelling force. Japan, America, Russia, and other countries have, owing to it, been developing their output of sulphate of ammonia and other fertilizers. Plants for the fixation of atmospheric nitrogen have been or are being established not only in this country and America but in other countries; and in the countries where such plants existed before the war there has been large supplement of output capacity. Germany to-day affords a lesson of what can be done in the home provision of all the nitrogen required for both explosives and agricultural needs. We have to accept the fact that sulphate of ammonia is in for stern competition. What the ultimate effect on market values will be will depend upon the relative costs of production, and the selling prices per unit of nitrogen, of its competitors.

The most promising development for the gas industry lies in the extraction of benzol. There is no need to anticipate over-production; and there is likely to be great competition for the production. The dye makers are anxious to protect their future in regard to it; the use of motor cars will develop enormously. Always benzol will be able to command a price at any rate following close to, if not equal to, that of petrol. What may be lost upon sulphate of ammonia profits should be largely compensated and more by benzol. Assuming a make of 28 lbs. of sulphate per ton of coal and the price of £15 per ton (which the most sanguine do not expect after the war) this is a revenue of 3s. 9d. per ton of coal, less working expenses. A production of two gallons of benzol per ton of coal should give a profit that will more than counterbalance any depreciation of profit under normal conditions on sulphate of ammonia through new competition.

From these considerations, it will be seen that the ratio of secondary product output to gas output is a point for inclusion in the discussion of the question of the composition and materials to be used for gas production, having regard to the prospect of a large growth in demand. Another point is that for the preservation of the efficiency of the country in national defence, and for the welfare of industries depending upon the products of coal carbonization, the development of the gas industry on the best lines, consistent with modern progress, must not be tampered with in any way, but must be given every opportunity for expansion. The pre-war position in regard to coke and tar, and the post-war position of sulphate of ammonia, demand that the benzol recovery work which has been promoted in the industry for war purposes, and which has necessitated large plants being erected, should be developed in the economic interests not only of the industry but of the country; and as it is an obvious economy that the secondary products should be treated as near as possible to the place of their production, it should be within the power of all large gas undertakings, or local groups of the smaller undertakings, to co-operatively carry on tar distillation and oil-debenzolizing work to the utmost extent. A technically composed Board appointed to deal with questions concerning fuel economy will wonder why economy has encountered obstructionists to such developments.

Nitrate of Ammonia.

Before the Society of Chemical Industry and the Midland Section of the Coke-Oven Managers' Association, Mr. E. Kilburn Scott has lately been advocating the conversion of the ammonia recovered in coal carbonization into nitrate of ammonia (instead of sulphate of ammonia) by means of nitric acid produced by the fixation of nitrogen from the atmosphere by electrical power; and he makes out an excellent case on paper, with the working figures well on the low side, and the probable profits represented as being on the high scale. Naturally, with the threatened after-war avalanche of fertilizers through the use of nitrogen derived from the atmosphere, and extended production from existing sources, carbonizers of coal are most desirous of knowing all about processes which offer them a more profitable utilization of their ammonia. The question is whether Mr. Kilburn Scott has really offered them anything that is commercially better. He more particularly addresses coke-oven managers; but he appears to have overlooked the fact that gas undertakings have hitherto been the largest producers of sulphate of ammonia, and are still about on an equality with bye-product coke-ovens, despite the increased amount of work at these during the war.

However, Mr. Scott probably addresses the coke-oven industry, in view of the gas and the waste heat that it has for disposal for the development of the electrical power with which he contemplates producing the nitric acid. In other words, he proposes the manufacture of nitrate of ammonia with "home-made" nitric acid, instead of making sulphate with purchased sulphuric acid. Relative production costs of the finished article, and relative selling values per unit of nitrogen, must determine the line of manufacture to follow. Perhaps Mr. Scott is unaware that trials are proceeding with the manufacture of nitric acid direct from coal gas and producer and low-grade gases, by explosion [*ante*, p. 21]; the experiments so far suggesting that, by employing coke-oven gas, about 6¼ lbs. of acid per 1000 cubic feet of gas exploded must be looked upon as the maximum. The plant and process appear simple enough. But more information is required for comparison purposes. However, Mr. Scott must know that for war purposes the sulphuric acid production capacity of this country has been considerably enlarged, with the result that the sulphuric acid makers are already anticipating a difficulty in maintaining their pre-war rate of profits when the war demand ceases. Moreover, there are gas-works that, utilizing the sulphur derived from the purification of their gas, have been making sulphuric acid cheaper than they could purchase on the market; and the

same course of procedure has been advocated in connection with the coke-oven industry. As a matter of fact, in order to utilize coke-oven gas in gas-engines for the generation of the electrical energy required for the production of the nitric acid, the gas would have to undergo oxide purification (which is quite a cheap process), and the sulphur be recovered. There is no reason, therefore, why the choice should not be between home-made nitric acid and home-made sulphuric acid. A further consideration is found in a paper read recently before the London Section of the Society of Chemical Industry by Mr. H. M. Ridge, who held out the hope of a considerable cheapening of sulphuric acid by the utilization of the sulphur contents of zinc ore. A notable paragraph in the paper is this:

> In 1913, our consumption of spelter amounted to no less than 224,000 tons, of which 74 p.ct. was imported. After allowing for the metal made by the refiners, we imported about 166,000 tons of spelter and zinc in other forms. If this quantity were all made from blende, the roasting fumes could be used to produce annually 400,000 tons of 140° Tw. acid. There is no reason why this should not be done, and the corresponding quantity of brimstone and non-cupreous pyrites displaced as well as a portion of the pyrites which is low in copper. Before the war, the cost of making 140° Tw. acid from zinc ore fumes in this country was only between 8s. and 9s. per ton; so that the operation is remunerative and profitable.

The price of sulphuric acid has a very large bearing upon the future of sulphate of ammonia made from the ammonia resulting from coal carbonization.

But let us turn from these pertinent considerations to the financial ones. For a 1000 KW. gas-driven electric generating plant, Mr. Scott estimates the goodly capital outlay of £28,000, or for one utilizing waste heat for providing steam £29,000. He calculates that either of these plants would produce electrical energy which, sold to the process at ⅛d. per unit, would on an 8000-hour use per year produce a revenue of £4166. Such use means practically continuous running. The £4166, it seems to us, has to stand a big strain—capital, wear and tear (which would not be light) and renewal charges, labour, and stores, and what is left the coke oven owner is welcome to for his gas. As the gas has obviously some value for other purposes, the coke-oven owner would be foolish not to wish to take credit for its fair value. If he does this, the ⅛d. per unit will find itself under these conditions ruled-out of existence before the coke-oven owner is properly satisfied, and it would probably pay him better to sell the gas to the gas industry. It is, however, upon the ⅛d. that so much depends in the cost fabric that Mr. Scott has constructed, and which from the designed plant gives him 1500 tons of 33 p.ct. nitric acid at £4 10s. per ton, which, with 125 tons of pure ammonia at £30 per ton, produces (by the employment of electro-chemical plant costing £8000 upon the expenditure on power plant) 635 tons of nitrate of ammonia at £16 10s. per ton.

There is a good deal that is speculative in the case Mr. Scott puts forward. He tells us that before the war nitrate of ammonia made by the electric process in Norway was selling in large quantities at £28 to £30 per ton. He thinks what has been will be. "The price per unit of contained "nitrogen will be higher for nitrate of ammonia than for "any other nitrogen compound. This has always been so, "because the combined nitrogen is 35 p.ct." Sulphate of ammonia producers are cognizant of certain things in this connection. The world's production of artificial fertilizers is going to be much greater after the war than before; and nitrate of ammonia among the rest will be subject to this greater competition. Moreover, sulphate of ammonia has in the past received a price per ton which has worked out to a smaller value per unit of nitrogen than lower priced nitrogenous fertilizers. Experience teaches us that farmers look at the price per ton as well as at the nitrogen value; and nitrate of ammonia is not going to alter this agricultural idiosyncrasy. The farmer will want to know why he should pay from £28 to £30 for nitrate of ammonia when in normal times he can buy nitrogenous fertilizers with more than half the same percentage of nitrogen at less than half the price. Mr. Scott credits nitrate of ammonia with advantages over sulphate of ammonia and nitrate of soda—one leaves the constituents of sulphuric acid in the soil, the other leaves sodium behind it. Where these fertilizers are utilized in a scientific manner according to the nature of the soil and the character of the crops, farmers make no complaint, excepting that nitrate of soda gets washed out of the soil quickly if heavy rains come too soon. Sulphate has an advantage over nitrate of soda in this respect; but nitrate of soda is credited with quicker action at the outset, if retained in the ground. But before the war, and this year particularly, the farmer has been learning that, in the use of sulphate of ammonia, a rich harvest (if not spoilt by weather conditions) follows his enterprise. To nitrate of ammonia, Mr. Scott gives an excellent character. After it has yielded up its nitrogen, only the constituent water is left behind. There is, however, one objection. It is deliquescent. But careful experiments are being conducted in the hope of overcoming this. In our wet climate, this characteristic will prove a disadvantage. On the whole, we think, coke-oven owners will want more satisfactory evidence than is afforded by the paper that they would be doing the right thing to engage in a heavy capital expenditure in order to change-over from the production of sulphate of ammonia to nitrate of ammonia.

The Session's Parliamentary Gas Work Ended.

There were only eight Bills and two Provisional Orders in which gas was concerned lodged for the consideration of Parliament this session. The sources of the origin of the measures and their nature will be found recorded in the first two issues of the "JOURNAL" in January. With the announcement of Mr. Speaker last week that the Act of the Sheffield Gas Company and that confirming Gas and Water Provisional Orders had received the Royal Assent, all the measures have now completed their parliamentary journey. Over this handful of measures, the gas industry has not worried Parliament much. Beyond the ordinary routine, only a couple of them (speaking from recollection) have required the services of a Select Committee. There were as usual at the outset several petitioners against the Bills; but most of them were quickly satisfied. Oppositions were withdrawn; and the Bills went forward with alacrity through all stages. Some of the Acts will show considerable modification in detail contrasted with the original form in which they were deposited; but we will not attempt on the partial information at hand to say what the changes have been. When prints of the Acts are in our possession for review will be time enough to complete the story of the session's work. However, it can at once be said that the industry has not distributed much money this year in the shape of fees among the members of the Parliamentary Bar or the gas specialists at Westminster.

A Matter of "Paramount Importance."

Report comes from the several coalfields that gas undertakings whose current contracts will be automatically abrogated on Sept. 8 are pressing to get into stock as much coal as possible under the contracts; and colliery owners, it is stated, are doing their best to comply with the pressure. Storage for winter has now a companion incentive for pressing forward deliveries in the desire of the Ministry of Munitions that there shall be, except for surplus gas requirements, a cessation of water-gas making, and that coal-gas plant shall be worked to its fullest practicable extent, in order to supplement the production of tar. Nothing but imperative need [see third editorial this week] would have authorized a change in the Coal Controller's appeal to the industry to economize coal by utilizing blue-water gas, or would have found the Controller actively participating with the Ministry of Munitions in a change which is directly opposed to what he had himself been working for. The Ministry knows very well it is no use working coal-gas plant to its fullest possible capacity without there is the demand for gas; and we are now passing through the period of minimum gas consumption. Hence the notice by the Minister of Munitions at the beginning of last week impressing upon the public, in view of the "paramount importance" of meeting the increasing need for bye-products obtained from the carbonization of coal at gas-works, the desirability of using gas in preference to any other means of obtaining light, heat, and power. The recommendation will not be liked in certain quarters where the coal used does not yield bye-products; but circumstances will not brook any disapproval. What a blessing the crazy notions of certain people in the electricity supply industry were not realized a few years ago, and that the gas industry did not become extinct before the war started.

The Wilts Company Denouement.

We have now the denouement of one of the promotion plots of the United Gas-Works Development Company, Ltd,; and a discreditable winding-up it is. The particulars will be found in

our last and the present issue. Now that the final stage has been reached in which the Official Receiver and Liquidator have been actively engaged over the affairs of the Wilts County Gas Company, Ltd., there is no desire to greatly irritate old sores. But with the arrival of the expected and certain end, we remember that Sir George Kekewich, K.C.B., the Chairman of the poor weakling with an ill-fitting capital, was very much annoyed with the criticisms and contempt that we poured upon a promotion which those with any knowledge knew well was over-capitalized, and that the picturesque inflations which were presented to the public as a technical estimate of prospects had not the ghost of a chance of being realized. The deficiency between the value of the assets and the capital shows how the subscribers of hard cash have been fleeced; and the "progress" of the concern well illustrates how terribly far short the "technical" prognostications have fallen from the glory imparted to them by a vivid imagination. The question is now being looked into as to whether those who profited by this scandalous piece of imposition upon the public can be made to disgorge the profits, or part of them, made out of the transaction. We would suggest that the Directors' fees should also be repaid, in view of the disclosures made by the Official Receiver and the Liquidator; for it is no use members of the Board suggesting that they took those protecting precautions which the outside subscribing shareholders had a right to expect they would take. As a matter of fact, one of the Directors when warned only took umbrage at what was said, and blindly continued to tread the road that led to Liquidator and Official Receiver.

Conventions in War Time.

Announcements have been made of the indefinite postponement or abandonment, in consequence of the entry of the United States into the war, of the regular annual conventions of a number of American technical and other societies—including those of the Gas Institute, the National Commercial Gas Association, the Illuminating Engineering Society, and the Iowa District Gas Association. Whatever may be the opinion mostly favoured so far as the scientific bodies are concerned, it is evident that there is in the States a growing feeling against the postponement of commercial conventions and similar fixtures. The Associated Advertising Clubs of the World, at their recent convention, when there were 2000 members present, passed a resolution requesting President Wilson to exert his influence to encourage the holding of all customary business and other conventions during the period of the war. In the opinion of the members, this course is necessary in order to ensure the continuance of the present prosperous condition of the country's business, to the end that it may be possible for the Government to more readily secure the greatly enlarged income required to vigorously and speedily prosecute the war, and so that none of the necessary activities of commercial life may be curtailed. Looking at the matter from this point of view, the National Commercial Gas Association are being urged to rescind the resolution abandoning the convention which had been arranged for next November at Detroit, and to show the importance to the national welfare of the commercial side of the gas industry. The argument put forward in the pages of "The Gas Industry" is that conventions for serious, real work, and interchange of views are wanted now more than ever. The great need for domestic and industrial economies, it is said, makes the commercial side of the gas business of vital importance in the present emergency. That is, the nation requires a perfectly organized and specially efficient commercial side in the gas industry, in order that the real economies desired, "not the unwise throttling of industry that some have advocated," may be accomplished. The Merchants' Association of New York, too, have expressed the opinion that the postponement of commercial conventions is a false idea of economy, the application of which will be harmful, rather than beneficial, both to the Government and to the nation's business.

The employees and friends of the Hull Station of the British Gas Light Company, Ltd., last Saturday week gave their third entertainment to wounded soldiers and sailors. The guests were received on the Company's recreation ground by Mr. John Young, the Engineer; and games and competitions were followed by tea. The band of the Lancashire Fusiliers played selections during the afternoon.

OBITUARY.

Mr. W. Doig Gibb has received intimation that his elder son, Second-Lieutenant J. H. Gibb, of the King's Royal Rifles, was killed in action on the 31st ult. He was only nineteen years old, and left Dulwich College last Midsummer term to join an Officers' Cadet Battalion. For some years previous to that he was an enthusiastic member of the Dulwich College O.T.C.

Captain W. G. S. Curphey, M.C., R.F.C., son of Mr. W. S. Curphey, the Chief Inspector of Alkali Works, was reported missing on May 14; but news has since been received that he died on the following day in a German field hospital at Bouchain. He was 21 years of age. In 1914, he joined the Royal Berkshire Regiment, transferring to the Royal Flying Corps in 1916, in which year he was awarded the Military Cross.

PERSONAL.

Mr. A. P. Trotter, M.Inst.C.E., M.Inst.Mech.E., who was until recently Electrical Adviser to the Board of Trade, is now returning to professional practice, and is entering into partnership with Messrs. Handcock and Dykes, at No. 11, Victoria Street, S.W. In one connection or another, Mr. Trotter's name has frequently appeared in the pages of the "Journal." He is President of the Illuminating Engineering Society, Vice-Chairman of the National Illumination Committee of Great Britain (affiliated to the International Illumination Commission), and Chairman of the Joint Committee on Illuminating Engineering of the Department of Scientific and Industrial Research.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

The following is the report of the Directors of the South Metropolitan Gas Company for the six months ended the 30th of June, which will be presented to the proprietors at the half-yearly meeting on the 15th inst.

After taking into account the balance of £33,659 19s. 2d. brought forward from last half year, and paying the sliding-scale dividend at the rate of £4 13s. 4d. p.ct. per annum, there will remain a deficif of £1742 14s. 10d.

These figures support the decision—at which the Directors reluctantly arrived—to raise the price of gas to 3s. 1d. per 1000 c.ft. as from Midsummer. It is significant that of this price the payment for war bonus and war fund is now equivalent to more than 4d. per 1000 c.ft., to which must be added the enhanced charges for freight, and for interest on loans required by reason of the high cost of labour and materials and the necessity for maintaining an exceptionally heavy stock of coal.

In the half year there has been the satisfactory increase of 12 p.ct. in the sales of gas, partly due to the difficulties generally experienced by the public in obtaining raw fuel. This progress is in the right direction, as thereby increased supplies of residual products are available to meet the national requirements.

The yields of gas and residual products have been well maintained, having regard to the difficulty in obtaining coal efficiently cleaned.

Authority having been given by His Majesty's Treasury for the issue of temporary capital under the powers of the Company's Act of last year, it is proposed to raise by redeemable preference stock and debentures the sum of £750,000.

The staff and employees of all grades continue to give wholehearted service, assisted therein by more than fifteen hundred female workers.

Charles Carpenter, *Chairman.*

709, *Old Kent Road, S.E.* 15., *Aug.* 1, 1917.

[The accounts did not come to hand in time for our usual abstract to appear in this issue, which, consequent on the holidays, had to be made up for press on Saturday.]

Tar for Open-Hearth Furnaces.—Writing to the "Iron and Coal Trades Review," Mr. Albert Nash suggests, as one means of saving coal, the use of tar for open-hearth steel furnaces. Without taking into account the tar produced at gas-works, he says that, assuming "the number of bye-product coke-ovens in the United Kingdom at 8600, the coal carbonized at 5 tons per oven per day, and the tar recovered at 6 gallons per ton of coal (this is a very low figure, and would permit of the lighter oils containing benzol, toluol, &c., being distilled off and recovered for explosive or dye manufacture), we have a total of 94,170,000 gallons of tar per annum. Taking the B.Th.U. per pound as the same in both coal and tar, and knowing that each ton of steel made in an open-hearth furnace requires about 6 cwt. of coal, we find that for a ton of steel we should require 58·4 gallons of tar. This means that the tar figure above (94,170,000 gallons) would produce 1,612,500 tons of steel, and would liberate 483,750 tons of coal. This is not a large figure, and might be considerably improved upon in practice.

COMMERCIAL GAS COMPANY.

Half-Yearly Report.

The following is the report for the first six months of this year, which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday, the 16th inst.

The Directors submit the accounts for the half year ended June 30, 1917. The revenue account shows a net profit for the half year of £41,732 17s. 1d., which, added to the balance of £75,867 6s. 5d. brought forward from the previous half year, produces a net revenue balance of £117,600 3s. 6d. Deducting £12,754 12s. 4d. for interest, there remains standing to the credit of the net revenue account a balance of £104,845 11s. 2d. available for dividend.

The Directors recommend the payment of dividends thereout at the statutory rates of £4 8s. p.ct. per annum upon the 4 p.ct. stock of the Company, and of 4 p.ct. per annum upon the 3½ p.ct. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

A resolution will be submitted to the meeting for increasing the remuneration of the Secretary.

William Graham Bradshaw, *Chairman.*

Gas-Works, Stepney, July 31, 1917.

The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 30th of June amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed at the date named was £339,062 10s., and £135,937 10s. was added by conversion, making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,533,883 5s. with a nominal amount of £1,212,812 10s. added by conversion—together £2,746,695 15s. There is thus a balance of £140,630 10s. 7d. carried to the balance-sheet. A sum of £50,948 was expended during the half year on new and additional steamships, £5863 on buildings, plant, &c., and £224 on mains and services; but £5101 is credited for stoves and prepayment meters and fittings. The reserve fund amounted at the close of the half year to £41,568, and the insurance fund to £27,811—in both cases after allowing for depreciation on investments.

The following is the revenue account:—

Expenditure.

Manufacture of gas—			
Coal and oil, including dues, carriage, unloading, and trimming	£214,631 7 7		
Salaries of Engineer and officers at works	3,978 11 8		
Wages (carbonizing)	14,350 14 8		
Purification, including labour	1,968 12 11		
Repair and maintenance of works and plant, materials and labour (less £893 12s. 9d. received for old materials)	29,357 5 7		
		£264,286 12 5	
Profit sharing		2,488 15 1	
Distribution of gas—			
Salaries and wages of officers (including rental clerks)	£7,213 14 6		
Repair, maintenance, and renewal of mains and services, material and labour	8,252 9 7		
Repair and renewal of meters	3,554 9 3		
" " " " stoves	12,863 5 4		
" " " " prepayment meters and fittings	11,950 1 0		
Maintenance of mantles and fittings	1,448 7 5		
		45,282 7 1	
Public lamps—lighting and repairing		3,491 6 8	
Rent, rates, and taxes		17,453 7 6	
Management—			
Directors' allowance	£1,250 0 0		
Company's Auditors	75 0 0		
Salaries of Secretary, Accountant, and clerks	1,243 11 9		
Collectors' salaries and commission	1,836 8 6		
Prepayment meter collection	5,892 13 4		
Stationery and printing	1,375 3 3		
General charges	3,174 4 7		
		14,847 1 5	
Bad debts		277 1 3	
Law and parliamentary charges		54 17 0	
Superannuations and allowances and Workmen's Benefit Society, &c.		2,683 18 0	
Official officers, &c.		90 1 6	
National Health and Unemployment Insurance		596 7 4	
Allowances to employees on active service		3,572 17 2	
Total expenditure		£355,124 12 4	
Balance carried to net revenue account		41,732 17 1	
		£396,857 9 5	

Receipts.

Sale of gas—			
Per meter (number in use, 116,823) at 2s. 8d. & 3s. per 1000 cubic feet	£261,715 7 11		
Public lighting and under contracts	5,099 5 8		
	£266,814 13 7		
Less discounts and allowances	13,751 18 2		
		£253,062 15 5	
Rental—			
Meters (24,451)	£3,101 12 6		
Stoves (88,524)	14,410 14 5		
Prepayment meters and fittings (91,699)	18,265 5 8		
Maintenance of mantles and fittings	772 5 1		
		36,549 17 8	
Residual products—			
Coke, less £5371 14s. 5d. for labour	£72,367 18 4		
Breeze, less £1364 19s. 8d. for labour	1,187 15 2		
Tar	14,951 18 5		
Ammoniacal liquor, sulphate of ammonia, &c.	18,708 6 11		
		107,215 18 10	
Miscellaneous receipts—			
Rent receivable	0 0 0		
Transfer fees	28 17 6		
		28 17 6	
Total receipts		£396,857 9 5	

The following statements relate to the working:

Statement of Coal and Oil.

—	In Store Dec. 31, 1916.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1917.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	21,448	134,433	111,741	668	43,472
Oil—gallons	534,331	1,099,635	1,005,597	..	628,369

Statement of Residual Products.

Description.	In Store Dec. 31, 1916.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1917.
Coke—tons	6,390	72,631	9,535	64,275	5,211
Breeze—tons	4,211	7,850	..	6,143	5,918
Tar—gallons	672,348	1,298,342	..	1,435,158	535,532
Ammoniacal liquor—butts of 108 gallons	14,682	36,477	35,879	2,805	12,475
Sulphate of ammonia—tons	170	953	..	1,097	26

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
2,112,848	30,985	1,881,594	1,944,272	3804

The final statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £89,641; coke and breeze, £6539; tar, ammoniacal liquor, sulphate of ammonia, &c., £12,652; sundry stores, £54,014—total, £162,847. The figures this time last year were: Coal, oil, &c., £27,944; coke and breeze, £2071; tar, ammoniacal liquor, sulphate of ammonia, &c., £8229; sundry stores, £44,599—total, £82,843.

A TREATISE ON SMOKE ABATEMENT.

Finding that, compared with other subjects, the number of books bearing on smoke abatement is small, Mr. H. Hamilton, A.R.San.I., a Qualified Smoke Inspector, and late Lecturer at the Middleton Technical School, set himself to fill a gap in the literature by preparing a treatise* for the purpose of instructing all those who seek information with regard to the matter, but more especially the student who proposes to sit for the examination of the Royal Sanitary Institute. The author states in his preface that it will be found to cover entirely the syllabus issued by the Council of the Royal Sanitary Institute; and if this is the case, its usefulness to those for whom it is more particularly intended is obvious. The Smoke Inspector has to be acquainted with a great many things; and thus the ground covered by the book is extensive.

In the first place, there is a history of smoke abatement, and an explanation of the chemistry of combustion; and then follows a chapter on furnace draught, the composition of chimney gases, and CO_2 recorders. A number of well-known stoking appliances are described and illustrated; and a chapter on smoke and its effects concludes with the true deduction that the stoker must be an intelligent man, and, furthermore, that he must understand what it means for him to pollute the atmosphere with black smoke. At the same time, for smoke prevention, it is not so much the stoker himself, as the method of stoking he adopts, that must be depended upon. It is quite evident, the author says, that the prevention of smoke depends on the complete combustion or burning of the fuel; and this is best secured by the maintaining of a high temperature in the combustion chamber. He considers the question of the admission of the necessary amount of air, and states that experience proves the plan of leaving the furnace a little open after charging to be a suitable method.

The important part played by producer gas plants in the abatement of the smoke nuisance is acknowledged, and particulars are given of typical plants. The same remark applies to town gas, oil, and electricity, though in this case the number of pages occupied is smaller. The domestic coal grate is, of course, not overlooked.

* "A Scientific Treatise on Smoke Abatement," by H. Hamilton. Sherratt and Hughes, Manchester; 1917. Price 5s. net.

Gas Calorimeter Tables.

The United States Bureau of Standards has recently issued [Circular No. 65] a supplement to Circular No. 48—"Standard Methods of Gas Testing"—as a result of numerous requests for a brief and concise set of operating directions for a gas calorimeter, and for a convenient set of correction tables. The tables are arranged in a sequence most convenient for use in connection with the proposed record sheet issued by the Bureau. The record forms for calorimeter tests shown in the circular have been used in America for some time and found to be complete and convenient.

ELECTRICITY SUPPLY MEMORANDA.

The pendulum swings with irregular movement between two phases of electricity supply affairs. At one time thought and discussion in electrical circles are concentrated on the reorganization of the industry, with the view to more economical production and supply of heating and power energy; at another time the men of the industry are swimming over with congratulation one to the other on the rich harvest that awaits their reaping after the war. The physical disabilities of electricity for competing effectively in some fields is a matter that does not disturb in the slightest. Electrical men rejoice and are exceeding glad because they simply believe that great things are in store. Soberly considering the situation, it is evident that the provision of cheaper B.Th.U. is a condition precedent to a large expansion in the domestic and industrial heating field; and electricity stands very badly in this respect. But there is no determinate view as to how electrically produced B.Th.U. are to be delivered to consumers at a cheaper rate than they can obtain heat by combustion means—by the use of gas or solid fuel; and value for money must always be the first consideration in commerce. The much abused Board of Trade Electric Power Committee may direct to the means of creating a thermal and money parity between electricity and combustion methods. But we have our doubts. At present, the schemes under contemplation range from linking-up existing systems to putting-down a few large concentrations of generating plant at the pit-heads or the nearest available points, including coal carbonization either in coke-ovens or by a low-temperature process, with the utilization of the gas under steam-boilers or directly in internal combustion engines for electricity generating purposes. There are a few sensible electrical men—like Mr. Hugo Hirst of the General Electric Company—who do not scorn the idea that it may be a very economical thing to transmit gas from the places of plant concentration as well as electricity. But we hear nothing about the financial aspect of these various schemes in comparison with existing plants, nor what is to be done with the capital that already reposes in the urban undertakings. This is a trifle which troubles few.

Simple Faith.

Carbonization, Centralization, and Distribution.

The amorphous ideas that possess some electrical men on, for example, the subject of carbonization have been previously noted in the "Memoranda." There are easily gullible ones in the electrical industry who have notions that the low-temperature carbonization system is the one that should be adopted in the future development of their fuel operations. Why they think so has never been made clear from the technical standpoint; and we doubt whether any of them could tell, other than by quoting the stock tale of ingenious men, some of whom know much more about company promoting than engineering and chemistry. It has been amusing to see ancient statements seriously quoted by modern electrical engineers, who have shown both a want of personal knowledge and a faith that beggars description in their interested tutors' teachings. We are sorry that a recent discussion before the Birmingham Section of the Institution of Electrical Engineers has not been published. In the course of it, Mr. E. W. Smith, M.Sc., the Chief Chemist of the Birmingham Corporation Gas Department, had something to say [*ante*, p. 195] which must have shaken a bit the confidence of some of the then present electrical votaries of the low-temperature coal carbonization system. The construction of large plants near the pits for the production of smokeless fuel and gas, combined with electricity generating plants, with in view the saving of coal freights, is, he holds, quite a delusion and a snare. We have pointed this out before, though not specially in connection with low-temperature carbonization. The ultimate cost to the consumer is the thing that matters. Bearing upon this comes the question: Is the distribution of electricity from the pit-head by cables and of gas by pipe-lines going to be successfully carried out within (so as to obtain a saving) the difference in cost of, on the one hand, conveying coal, and, on the other hand, the solid and liquid products derived from its pithead carbonization. These latter would still have to be transmitted by rail throughout the country, which is contrary to Nature's thoughtful provision of a compact portability in the form of solid coal, so that the variety of wealth contained in it can be conveniently separated therefrom where and as required. As Mr. Smith says, the solid fuel produced by the low-temperature system would amount to 75 p.ct. of the original coal, and the space occupied by it in trucks would be greater than that of the original coal. Wagon hire would accordingly be increased. Moreover, it is surely wasteful to leave in the solid residue at least 10 p.ct. of volatile matter, or between 30 and 40 p.ct. of that which was originally available in the coal. This volatile matter is the very material from which some of the much-wanted products are procured. Besides this there is the point not mentioned by Mr. Smith, that few coals yield at low temperatures a good coke; and if, for the purpose of producing good coke at low temperature, selection has to be made of the coal used, this means a considerable addition to the cost of the coal purchased, if the demand for special sorts becomes large. Moreover, the electrical industry, being in search of a larger heating load, does not want to promote the output of a smokeless fuel competitor in the shape of low-temperature coke. The low-temperature system, too, is wasteful in gaseous products and ammonia. There are, however, some electricians who fancy the employment of coke-ovens. The demand for metallurgical coke has its limits; and at these limits, assuming the coking industry is prepared to give up to the electrical industry its place in the coal-carbonizing world, ends the hope of adopting this particular system as the root of the operations of electricity supply.

The Objectionable Gas Industry.

It is easy enough to see the reason why electrical men cut-off at low-temperature carbonization or carbonization in large bulk (as practised by the coke-oven industry) consideration of this question of the better utilization of the bituminous coal that now finds its way into the greedy jaws of the furnaces of their steam-boilers. It is simply because of the competing relations of the gas industry that electrical engineers will not look at the possibilities that exist in its established position and its products in effecting a working business union, though they know of no carbonizing method that can use a ton of coal to better advantage. Plant, organization, statutory powers, and everything else are in existence that tend to economic service; they only need extension and adaptation. But the electrical industry has its doubts and fears as to a union with the gas industry. The fears have their origin in doubt as to what would be the ultimate end of such an alliance. Whatever the end, we have not the slightest doubt that it would be the one directed by the natural evolution of things in the matter of the provision of light, heat, and power for the use of our urban communities and industries. However, of this thinking electrical and other technical men who know anything of coal carbonization are fully persuaded—that the present destructive use of coal and all it contains for the one purpose of producing electrical units each possessing a heating value of only 3420 B.Th.U. cannot, and will not, be permitted to continue indefinitely. Yet the readiest solution of the problem is the most objectionable. We ask electricians to think over the size and operations of the gas-works of the country, of the large percentage of gas sold for heating and power, of the extraordinary fluctuations that take place in the gas demand for heating between season and season, day and day, and even hour and hour, and see what these things mean in relation to generating plant, cables, and the ambitions of the electricity supply industry with its 3420 B.Th.U. electrical unit.

A Vision, and a Disturbing Element.

Not only in the electricity supply industry, but in all departments of the firms manufacturing electric appliances, there is "buoyant confidence." So writes the Electrical Correspondent of "The Times Engineering Supplement." Public and private consumption of electricity must in his view "tend" to increase, and "probably" at a rapid rate. The guarded manner in which he makes this statement is noteworthy. No doubt he has in his mind's eye the plant representing present capital expenditure, and the cost at which capital, materials, labour, and fuel will stand for some long time ahead. But being an "Electrical Correspondent," it is his business to make the best of the position. However, it is, in his view, inconceivable that national policy will permit of the full resumption of the sort of mischievous foreign competition which was sorely felt for many years before 1914. The scheming of the German trust groups is now known to have been directed to much more than the filling of order books. It was deliberately designed to infect with a chronic sickness the British manufacturing groups. Although it is impossible to make an estimate of the work already visible and tangible, he sees that the capacity of the plant and apparatus factories is likely to be low in proportion to the business awaiting the conclusion of peace. The electrification of railways, the equipment of mines and factories, the general spread of domestic applications, the greater use of electricity in marine engineering and in agriculture, will overtax their power of production. He is looking far ahead of the probabilities sanctioned by existing conditions. It is feared by some manufacturers—those now making and dealing in small generating machinery, with gas, oil, or steam prime movers—that the great pending technical reform will put them out of business; but the optimistic correspondent gives them temporary heart by assuring them that they will have a few years in which to turn round, even supposing that by 1930-40 the whole country is getting its electricity from a couple of dozen grand central stations. Still requiring the services of these manufacturers will be numerous isolated power users in districts disdained for the time being by the trunk mains; and there is always refuge to be found in the making of consumers' appliances. It is a beautiful picture; but over it, so far as domestic and industrial heating operations are concerned, there hangs as a cloud the generating end, as well as the relation of the low thermal value offered by electricity to the greater generosity of other means of meeting public requirements. Electricians may propose; but public patronage determines. And a factor in the determination is value for money.

Humour from Hornsey.

While referring to electricity for domestic heating, and as a supplement to a paragraph that appeared in the "Memoranda" last week, we may allude to a criticism in "Electrical Industries" of efforts to push expensive electric heating at Hornsey. The Electricity Department there have issued a circular on the subject of domestic heating, which our contem-

porary thinks a little ill-advised. The circular states: "Having regard to the possible difficulties with coal supply during the coming winter, it is desired to point out to consumers the very great convenience of electric-heaters. By installing electric-heaters, you will to a considerable extent safeguard yourself against any coal shortage, and will, in effect, increase your private coal stock." The circular proceeds to point out that electric-heaters are very efficient and effective, and extremely adaptable for heating any part of the house. We will not criticize the "convenience" of an electric-heater. As to the "efficiency and effectiveness," many users have shown an inappreciation by changing-over to gas-fires. Upon the question of cost, the paragraph of last week—bearing the side heading "The Coal Controller's Advice"—had something to say. But our electrical contemporary thinks the advocacy of Hornsey may do more harm than good to the electric heating business. Among other scathing remarks, we find this: Electric heaters "are emphatically not an economical substitute for the continuous heating of rooms at the tariff now charged in Hornsey—2½d. per unit. If, in obedience to the notice, any consumer were to use a 2 KW. electric-fire for warming his sitting-room, the first quarterly bill would be equivalent to culpable homicide." And this by the use of only *one* heater! Two units for fourteen hours a day would cost 5s. 10d.; and a week of this would run away with £2 0s. 10d. Our contemporary thinks that "supply undertakings which cannot (or think they cannot) supply current for heating at something like 1d. per unit would be well advised to leave the heating business alone." Even 1d. per unit, cold weather, and fourteen hours' use per day would mean 2s. 4d., and a week 16s. 4d.! And this—granting in charity the absurd claim of 100 p.ct. useful heating efficiency—for only 6480 B.Th.U. per hour. The stress of the times is difficult enough without the cost burden of heating by electricity. But there is a humorous side to this attempt to impose in this matter upon the untutored public.

Electric Steel Furnaces.

There is one field—that of steel making—in which the electric-furnace has obtained a footing, and would establish itself at faster pace if the electrical heat energy could be supplied at a cheaper rate. In an article in the "Iron and Coal Trades Review," Mr. E. Kilburn Scott states that of the Greaves-Etchells type of electric steel furnace, more than thirty have been installed or put under construction since Jan. 1, 1916, that very soon there will be fifty electric-furnaces at work in the Sheffield district, and that the output of steel from them will be at the rate of upwards of 200,000 tons a year. In a comparison with the crucible steel process, Mr. Scott says it may safely be stated that a 10-cwt. electric-furnace running a charge every two-and-a-half hours, or (say) nine charges per day, will do as much as 36 crucible furnace holes, each having two 56-lb. pots. The electric-furnace is operated by one skilled man, one unskilled man, and one ammeter boy, whereas the crucibles require fifteen men. The electric-furnace only takes up about one-quarter of the space occupied by, and can be installed at about half the initial cost of, the crucible plant. Owing to low heat efficiency and high cost of labour, crucible steel is declared to be much more expensive to manufacture; but the article omits actual costs. The expense of renewing crucibles is considerably higher than the renewal of an electric-furnace for the same output. The author also holds that the crucible steel process has been largely responsible for waste of the nation's resources, by reason of the coke used being made in beehive ovens—this quality of coke being necessary for the process. He thinks the electric-furnace should help to stop this waste in the future. How so? Does the Sheffield electric generating plant incorporate coal-carbonizing and bye-product recovery processes? And what is the average consumption of coal at the Sheffield electricity generating station per 3420 B.Th.U. delivered to the users of electric-furnaces? Since this paragraph was written, we learn from the Statistical Report of the Iron, Steel, and Allied Trades Federation that the total number of electric furnaces built or building in 1916 was 91, against 45 in 1915.

Wounded Men in France.

Regarding the kindly desire of M. Rouland, the President of the Société Technique du Gaz en France, to be furnished with information as to wounded British gas men lying in hospitals in France, so that they may receive attentions from himself or his colleagues [*ante*, pp. 13, 15], Mr. Walter T. Dunn will be glad to receive, at the offices of the Institution of Gas Engineers, No. 39, Victoria Street, S.W., particulars from further engineers who have members of their staffs or men in hospital in France.

Association of British Chemical Manufacturers.—Representatives of the Association of British Chemical Manufacturers had an interview last Thursday with Dr. Addison (the Minister of Reconstruction), who invited them to co-operate with him in preparing to deal with the problems which will arise in the chemical industry after the war. It was arranged that the Council of the Association should act as an advisory body in connection with this branch of the work of the Ministry of Reconstruction, and that Mr. Charles Carpenter, D.Sc. (the Chairman of the Association), Sir William Pearce, M.P., Mr. J. F. L. Brunner, M.P., and Mr. J. W. Wilson, M.P., should form a Committee to discuss with the Department the best methods of procedure.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

The Annual General Meeting.

The Fifty-Eighth Annual General Meeting of the German Association of Gas and Water Engineers was held on June 22, at the premises of the Association of German Engineers in Berlin. The first portion of the summary of the proceedings taken from the reports in the "Journal für Gasbeleuchtung," by the official reporter of the meeting (Herr Heidenreich), consisting of a general review by him of the circumstances in which the meeting was held, was given in the "Journal" last week [p. 188]; and the following are the minutes of the proceedings.

I.—Opening of the Meeting.

The President (Herr Hase, of Lubeck) opened the meeting at 9.15 a.m. He referred to the course of the war during the past year, and concluded his speech with a cheer for the German Emperor, which was heartily responded to by the meeting. He then welcomed all those present, and especially the guests, and read a message of congratulation from the Association of Gas and Water Engineers of Austria and Hungary. After alluding to the losses which the Association had sustained by death, he mentioned that Professor H. Bunte, the Acting General Secretary, had been made an Honorary Doctor by the Technical College of Vienna.

II.—Position of Gas and Water Works in Wartime.

The President then gave his promised lecture on this topic. He spoke first of water-works, which had earlier experienced a decrease, and later an increase, in consumption. The changes in consumption appeared to be due to reductions in the size of households and the restriction of industry on the one hand, and to the erection of hospitals and new munition works on the other hand. The fuel consumption of the pumping-stations had increased owing to the poorer quality of the coal. Diesel engines had had to use tar as fuel; and coke and breeze grates had been installed very extensively. Many difficulties had ensued from the poor quality of the lubricating oil used; and on this account many works had had to lower the temperature of the steam employed. Substitutes for lubricating oils had not in most cases proved satisfactory. Many difficulties had also ensued from the dilution of the trained staff; but, nevertheless, no very serious interruptions of water supply had been reported anywhere.

Gas-works had suffered especially from the shortage of coal, with the consequence that in various towns there had been considerable interruptions in the supply of gas. Limitation of consumption, which must necessarily follow a shortage of coal supply, was not in the national interest, because reduced delivery of gas meant an increase in the general consumption of coal. All efforts therefore should be directed towards maintaining the supply of coal to gas-works. The shortage of staff had also caused many difficulties on gas-works. The Council of the Association had been endeavouring to bring about an equitable distribution of the coal-tax. The President also referred to the problems confronting the Association in regard to the after-war period, proposals for re-organization, the difficulties of works in hostile countries, which generally speaking had been greater than in Germany, and, finally, he mentioned the "lamentable attacks on Germany which had appeared in the English Technical Press."

Herr E. Körting (Berlin) expressed the thanks of the meeting to the President for his lecture, and went on to speak of the coal supply to gas-works. He was of opinion that the quantities of coal of which gas-works were now short could very well be withdrawn from the coke-ovens; and that a restriction of gas should be advocated only in very urgent cases. Herr Permien, of Rostock, spoke in the same sense, and said that following up the President's statement, efforts should be made to obtain a special ordinance to provide for the coal supply to gas-works. Herr Kümmel, of Charlottenburg, observed that the restriction of the operations of water-works which the authorities had in mind would cause great difficulties, and would be impracticable without incurring the risk of serious breakdowns in the service. Herr Scheller, of Landshut, wished to see uniform restriction of all works; whereas Herr Permien, of Rostock, considered that local conditions should be taken into account. Herr Lempelius, of the Central Gas Bureau, said that gas-works should be supplied in 1917 with the same quantity of coal as in 1916. The President expressed the opinion that efforts should be made to secure authority for the managers of gas-works to restrict consumption in case of necessity as seemed best to them. Herren Falk, of Graudenz, Liepel, of Griesheim, and Georgi, of Viersen, also spoke on the question of coal supply.

Herr Kuckuck, of Heidelberg, referred to a fire which had broken out in a Rank's coal storage tank or silo at his works, which he attributed primarily to the mixing of different coals when being put into store. Herr Jäckel, of Plauen, also referred to a fire in the coal-storage tank at his works, and the measures adopted by him to prevent further outbreaks. Herr von Gässler, of Hanau, recommended the subdivision of the tanks or silos into smaller compartments.

Herr Ohly, of Cologne, then made a report on gas-works bye-products, dealing with the circumstances which affect the market,

the effects of State embargoes, the encroachments of coal distributing depôts, and the utilization of gas coke in industries where other materials have hitherto been used. Herr Terhaerst, of Nuremberg, expressed the opinion that tar-distillation plant was only suitable for adoption in large gas-works. The plant at his works had been erected primarily in order to make them independent of the tar buyers' rings, but also to produce tar oil for use as a fuel for power production on the works and to recover oil for naphthalene extraction. Herr Kayser, the Chairman of the Coke Bureau, read a paper on Coke as Fuel, which is to be published shortly.

Professor H. Bunte next spoke. He dealt with heating problems, the complete gasification of coal, and the displacement of other fuels by gas. He concluded that the old recommendation to "cook by gas and heat by coke" was still sound policy. He advised that coal should be bought and sold not according to its size, but according to its value in use.

Herr Terhaerst further reported on the trials which had been made at his works with electro-motors which were designed to be proof against risk of causing fire. The safety appliances of the firm of Schuckert appeared, according to his observations, to answer for rooms in which there might be escapes of coal gas, but not when the escaping gas was one very rich in hydrogen [? hydrogen for air-ships]. Dr. Leybold, of Hamburg, referred to the use of electromotors in the apparatus houses of gas-works, from the standpoint of the workmen's accident insurance scheme. He had come to the conclusion that the necessity for their use had not been proved, as it was everywhere possible to employ steam-engines. Herr Terhaerst recommended that the investigations should be pursued, and Herr Schallenberg, of Dresden, vigorously opposed Dr. Leybold's attitude, and advocated freedom to use electro-motors in the apparatus houses of gas-works.

Herr Reinhard, of Leipsic, lamented the lack of labour, especially for the retort-houses, and stated that he had petitioned for the return to him of all his retort-house hands who were now with the colours. Herr Körting, of Berlin, said that, according to his experience, there was no prospect of such a petition being answered favourably.

III., IV., & V.—Annual Report, Accounts, and Estimates.

The annual report of the Council of the Association, having been circulated in print, was taken as read, and approved. The accounts for the past year were similarly approved by the meeting, and the estimates for the ensuing year were presented and accepted. [A summary of the annual report will be given in an early issue of the "Journal."]

VI.—Technical Committees.

The Committee on Standards was dissolved—its work being handed over to the Committee on Pipes. Herr Götze, of Bremen was elected as Chairman of the Water-Works Committee, in succession to Herr Reese, of Dortmund, resigned. The President reported to the meeting the terms of a new contract which the Council had made with the publishing house of R. Oldenbourg, of Munich, in respect of the "Journal für Gasbeleuchtung," which is the official organ of the Association. The meeting approved the new contract.

VII.—Election of Officers.

Herr Julius Geyer, the General Manager of the Gas Industry Company of Augsburg, was elected a Vice-President in succession to Herr Terhaerst, of Nuremberg, whose term of office had expired. Herr Ries, of Munich, proposed, and the meeting decided with acclamation, that Herr Hase, of Lubeck, should be re-elected as President of the Association for another (the third) year. The three members of the Council whose term of office had expired were replaced by Herren Terhaerst, of Nuremberg, Runge, of Dantzig, and Schwers, of Osnabrück. The Central Gas Bureau, having become affiliated to the Association in the same way as the eight District Associations, is entitled to a representative on the Council, and Herr Frahm, of Baden-Baden, was chosen as such.

The proceedings terminated at 2.30 p.m.

GAS AND WATER WORKS IN WAR TIME.

THROUGH GERMAN EYES.

[Presidential Address of Herr M. Hase, of Lubeck, at the Annual Meeting of the German Association of Gas and Water Engineers on June 22.]

We live in a time of perpetual changes and growing difficulties. How are others faring? Is it right to speak of these things? Certainly the proverb says that "Silence is golden." But there are cases in which it is our duty to talk; and one of these cases is presented by this meeting, at which we review the happenings of the past twelve months. . . . Allow me to draw a picture of the past events and effects of the war. Last year, I dealt solely with the effect of war on the gas industry, and refrained from dealing with water-works, which therefore may now appropriately be referred to first of all.

Water-Works as Users of Coke and Tar.

Obviously water-works should not be affected by the war to the same extent as gas-works, as they are not conducted from the standpoint of industrial so much as of social and hygienic interests. There is no incentive to increase output—rather reasonable economy in consumption is aimed at. . . . Consumption has fluctuated, as a result of the war, up or down according to local conditions. [The author proceeded to discuss at considerable length the causes of fluctuations in the consumption of water in various localities, the increases in the number of consumers, the supply and renewal of water-meters, and the scarcity of outdoor staff and plumbers, which was especially felt during the prolonged frost of last winter.]

There has been great difficulty in obtaining the requisite supply of fuel for the pumping-stations, though only temporary lack of coal rather than a general shortage has been reported by most water-works. In critical cases the military and railway authorities have provided relief, because they had a great and direct interest in the maintenance of the water supply. Since the autumn of 1916, however, deliveries of coal have been most uncertain; and if there is no change in the present generally extremely unsatisfactory coal supply, it is to be feared that some water-works will be put out of action. The same is true of water-works which use gas or electricity for power; for though hitherto, with few exceptions, supplies have been adequate, the prospect is now disconcerting. If gas and electricity works are compelled, owing to scarcity of coal, to restrict their working or shut off the supply at certain periods, the distribution of water will be imperilled. Happy are the water-works (not an inconsiderable proportion of the whole) which have the advantage of a natural fall from the source of supply to the district.

The question of the substitution of other fuel—especially coke—for coal, has been taken up with good results at many water-works; but, generally speaking, it is better to leave gas coke for domestic use, as its employment by water and other public works only intensifies the insufficiency of the fuel supply to the general public. From 10 to 40 p.ct. or more of coke has been mixed with the coal for boiler fuel—the coke being sometimes ordinary gas coke, sometimes oven coke, and at times small coke, coke breeze, or coke dust, while brown coal, briquettes, and wood have been used. It is desirable that the results of these attempts to displace or dilute coal for boiler-firing should be published.

The increased cost of coal delivered has so far averaged 45 p.ct.; but it is still advancing. The quality of the coal has fallen off greatly—more especially recently; so that there has been a rise in coal consumption equal to 10 to 50 p.ct. per 1000 gallons of water distributed, or a reduction in the efficiency of the pumping-station plant per pound of coal used of 10 to 25 p.ct. The conditions have been especially unfavourable for works using Diesel engines or other engines consuming liquid fuel. Gas-oils and tar-oils were obtainable only in small quantities, and deliveries were unreliable. It was necessary to keep other sources of power in reserve. Similarly suction-gas engines had to be provided with a supply of town's gas for use in case of need. Since the autumn of 1915, the Diesel engines at Hamburg have used only coal tar as fuel. By recourse to emergency supplies of power, however, it has been generally possible to avoid serious interruptions in the supply of water.

The type of grate is a matter of great importance in connection with the substitution of coke for coal. With the plane or horizontal grate, stoked by hand, there is generally no difficulty—especially if a blower can be used. With skew and rotary grates, however, only coke of a certain size, free from breeze, can be used, and mechanical stoking has to be discarded. Broadly speaking, however, the use of unusual or inferior fuels has not caused difficulty. Most trouble has arisen from coal that gives ash which fluxes readily. Boilers with ample water space in conjunction with steam-engines have responded best to war conditions. It has been necessary to cut-out superheaters, in order to reduce the steam temperature, on account of the inferiority of the lubricants available. It has frequently been necessary to increase the number of shifts where coke was used, owing to the lower physique of the stokers, and the substitution of hand for mechanical stoking. But there have been a few cases of reversion from eight-hour to twelve-hour shifts.

Engine Troubles.

Except where pre-war stocks have sufficed, ill-effects have been felt from the character of the packing and lubricating materials now available. Inferior oil has been mainly responsible for bearings running hot, cylinder obstructions, valve-troubles, &c. More oil was used, and engines, apparatus, and oil-feed pipes needed cleaning more frequently than formerly. Much of the mischief caused will be realized only when the war is over. Opinions are divided as to the utility of adding graphite to the oil. Heavy greases cannot take the place of oil, though they may be used in conjunction with it. Scarcity of grease packings necessitates more frequent renewals. It is reported from Hamburg that the packing-rings of the pistons of horizontal engines have needed renewal or cleaning more frequently, but that this has not been the case with vertical engines, for which, however, the degree of superheat of the steam has been lowered. Thanks to good stocks at the outset, the scarcity of rubber, asbestos, copper, bronze, &c., has not yet been seriously felt by most undertakings. But metallic packings on steam-engines could not be renewed, and stuffing-boxes for ordinary packing had to be substituted. Bronze valve rings had to be replaced by lead-coated sheet iron. War-metal valves have proved unsatisfactory; but the bronze bushes of pumping-engine shafts have been satisfactorily replaced by white

metal ones. Rubber springs were less durable than formerly. Substitutes for leather for washers, &c., of pump-valves were also less durable than leather. The materials used as substitutes in water-meters, valves, taps, hydrants, unions, &c., have not generally been in use long enough for final judgment to be pronounced on them. The character of the water has an important bearing on the success of some of these substitutes.

Depleted Staffs.

Water-works have perhaps suffered less than gas-works from shortage of staff. But in some cases only a few elderly hands have been left. In one town of 10,000 inhabitants the engine-room work is done entirely by an engine-man of 63, assisted by a 17-year-old youth. The attention of the staff still left has in most cases had to be concentrated on maintaining the supply of water, and in a few instances even filtration has at times had to be neglected—let alone meter-reading and testing, waste-inspection, &c. The help of prisoners of war has been comparatively rarely resorted to. They work slowly, and at the best only passably well. They do only one-half to two-thirds the work of the practised German workmen. Russians are more willing and industrious than the more intelligent Frenchmen. One large works reported very bad results from the employment of Russian prisoners of war; but this was as nothing in comparison with its experiences with Belgian civilian workmen, who, on account of their derisive behaviour had to be sent back post haste.

Women have been but little employed on the works, though extensively on the outdoor staff. One report is that for heavy work six women do about as much as three old or feeble men, or as two ordinary men in peace-time. They are often absent on account of urgent domestic duties, indisposition, &c., and dislike Sunday and night work.

In imperative cases, where other labour has been unobtainable, the military authorities have lent men to water-works for short or long periods. The managers of works, however, have to go hither and thither to get the necessary permits—the War Office machinery not always working well in this respect.

In a few instances the profits of water undertakings have been maintained or increased; but generally speaking they have fallen. Figures for several undertakings obtained by the author show an average fall of 13 p.ct. in 1916-17 compared with 1913-14. The rates charged for water have not generally been raised. Where it has been done, it has been either an increase of 1d. to 1½d. per 1000 gallons or a war surcharge of 5 to 20 p.ct. on the total of the account. It is anticipated, however, that rates generally will be increased very shortly. The incidence of the coal-tax is one of several reasons for the impending rise.

Broadly speaking, water-works have not been affected by the war to the same extent as gas-works. The community, however, owes a debt of gratitude to the managers, staffs, and employees of water-works for their devotion to duty, as evidenced by the fact that in very difficult conditions of labour, supply of coal, and facilities for renewals and repairs, they have succeeded in maintaining so good a service.

(To be continued.)

COAL GAS AS A MOTOR FUEL.

There is published with the August issue of the "Bulletin of the British Commercial Gas Association" a report on the possibility and practicability of the use of coal gas in lieu of petrol or benzol as a fuel for driving the engines of motor vehicles. Drawing attention to the matter, "F. W. G." says:

The report makes it clear that on the score of cost coal gas, even at war prices, has a marked advantage over petrol, the basis for comparison being that, varying with the quality of the gas and of the petrol available, from 300 to 250 c.ft. of gas equal in propelling power a gallon of petrol. So that petrol would have to be supplied at from 10d. to 1s. per gallon to compete with coal gas at 3s. 4d. per 1000 c.ft. This is only in confirmation of experience previously obtained by the substitution of gas for petrol for the running-in of engines in the shops of motor-car makers, which has been done to their marked advantage by a number of leading firms. The report also points out that, so far from the use of gas instead of petrol having any disadvantage from the point of view of maintenance, it has the advantage of keeping the valves, &c., free from deposits.

The *crux* of the whole question, however—the serious obstacle to the wholesale substitution of gas for petrol, at any rate during the war—is that of storage. The carriage of sufficient gas for a comparatively short journey in a flexible container (or gas-bag), such as is being used successfully on a number of chars-a-bancs, trams, omnibuses, and other vehicles, obviously is not much more than a make-shift, and can have no wide and general application to the problem of motor fuel. It will probably have a considerable, though still limited, vogue during the war, and until the supply of motor spirit returns to something like pre-war conditions; but if coal gas is to take a permanent and substantial place among motor fuel, some satisfactory means will have to be devised for carrying it under compression in containers of adequate strength, but not excessive weight.

The prohibition of the use of steel during the war for the construction of such containers has for the present rendered the necessary amount of experiment on these lines impracticable, and the adoption of the system impossible. But the report clearly indicates that, when experiment is possible, it will be eminently desirable, and is very likely to prove fruitful. That is as far as the question can be carried at the moment; but it will be pursued to a conclusion as soon as ever the time is ripe. Meanwhile, if facilities can be provided, preferably at garages, for supplying a considerable quantity of gas in a short space of time—say 500 c.ft. in ten minutes or a quarter-of-an-hour—there is little doubt that many users of vehicles suited to the carrying of gas-bags of that capacity will resort to the cheap fuel which is obtainable in lieu of the dear fuel which is scarce or non-obtainable.

THE RECONSTRUCTION OF INDUSTRY.

By Thos. Newton.

The task of devising ways and means for the ultimate reconstruction of industry is rapidly becoming a matter of supreme national importance; and the problems involved merit the most careful consideration of all sections of the community. While a certain amount of boldness and originality in grappling with the many intricate details of the proposed reconstruction are eminently desirable, it should be borne in mind that these self-same intricacies require very delicate handling if the interests and welfare of all parties are to be anything like permanently reconciled. It is true that trade union rights and privileges have been waived to an unprecedented extent in order to facilitate output; but it would be a mistake for anyone to assume that the Unions concerned will indefinitely acquiesce in the *status quo*.

Restoration of the Old Conditions.

The Government, in a great national emergency, and in its laudable anxiety to obtain an immediate and ungrudging response to its insistent requirements, repeatedly pledged itself to a restoration of the old industrial conditions after the cessation of hostilities, without particularly either knowing or caring whether or not such procedure would be possible or desirable. The line of least resistance was thus mapped-out and followed; and it is only fair to state that it served its immediate purpose. The trade unions fastened on the pledge, notwithstanding the frequent charges which have been levelled against restriction of output, which is alleged to exist even to-day in some trades, although an unrestricted output was definitely understood to be one of the conditions of the contract. However, as the Government has recently felt constrained once more to renew its assurances and repeat its pledge to organized labour, it is well worth while considering what is involved. While it may be true that organized labour is satisfied in the abstract that the pledge will be redeemed, it is extremely doubtful if organized labour desires to see the entire fulfilment of the promise in the concrete.

Under the old conditions, an era of wasteful competition ran riot. Wages paid were comparatively low. Selected industries of only minor importance were unduly emphasized, while important key industries were either entirely lost to this country, or were rapidly in danger of becoming strangled. Output was notoriously restricted, irrespective of its baneful economic and commercial effects; and our man-power was prodigally wasted by a slavish adherence to many antiquated methods and processes. To scrap machinery, however obsolete, was considered by some manufacturers to be little short of a crime. Hence, highly-skilled labour was retained to perform work upon obsolete machines, and in some cases was expected to do economical work in the absence of machinery, notwithstanding the fact that better economic work could be obtained by unskilled labour in the presence of, and with the aid of, modern machinery. Under the old conditions, dilution of labour—a clumsy misnomer—was not to be thought of for a moment; and the net result of a policy of the conservation of the worst elements of industrialism was reflected in an industrial "marking time."

These, then, are a few of the old conditions which were securely entrenched in industry at the outbreak of the war, and which should be borne in mind when the restoration of the old conditions is seriously contemplated. A bare review of this by no means exhaustive list of them shows how inimical the old conditions are to the interests of both masters and men. After a spell of phenomenally high wages, it may be taken for granted that organized labour will be very loth to return to the old rates of pay, just as employers who, having invested in modern machinery—thus obtaining a greater output with less skilled labour—will also be loth to return to the methods and standards of production which characterized the old conditions. During three years of war industrial productiveness has probably developed at a greater rate, and to a larger extent, than it would have done in a quarter of a century; and to ignore the war lessons in productivity would be tantamount to annihilating industrial invention and development. Clearly, then, a return to the *status quo ante bellum* would be unthinkable, and against the best interests of all concerned.

Position of the Skilled Worker.

In any consideration of the problem of the reconstruction of industry, the position of the skilled worker is a matter of the utmost delicacy, calling for sympathetic and frank treatment. By means of financial sacrifice, through the instrumentality of his trade union he has sought to improve his status, and win for himself and his fellows certain rights and privileges which constitute an industrial charter. This charter is defined by laws, rules, customs, and usages, both written and unwritten; and it almost goes without saying it is jealously guarded. Any violation of its terms is

violently resented—unless it progresses in a direction favourable to the worker. Now, in order to obtain the standpoint of the skilled worker, one must needs project oneself mentally into the position of a man who, having a cherished possession which he has been induced to relinquish temporarily, suddenly realizes the impracticability and undesirability of regaining possession. But, alas! he has nothing to take its place—no effective substitute. And this is likely to constitute his grievance. There is just a slight suspicion in the minds of organized skilled workers that they have been negotiated into a false position which is likely to work out to their ultimate disadvantage; and this has had not a little to do with the recent exhibitions of labour uneasiness. Unfortunately, in the past they have seen every effort in the direction of increased production reflected in a scientific and systematic reduction of piece rates; and while the exigencies of the war have somewhat interfered with this time-honoured arrangement, there is a lurking suspicion that this arrangement will be speedily reverted to as soon as the times are propitious. Thus are the old antagonisms likely to be perpetuated, unless some common-sense methods prevail. In any desirable scheme of industrial reconstruction there is no real necessity either to restrict production or depress piece rates; and it should be borne in mind that nothing is likely to be so unsettling, or so prejudicial and detrimental to the industrial future of this country, as to attempt to restrict production on the one hand, or on the other to encourage unlimited production simply for the express purpose of cutting wages.

A Community of Interest.

Viewed in the true perspective, the skilled worker, no less than the unskilled, should look forward with every confidence to the industrial prospects of the future; and this also applies to employers generally. There have been in the past legitimate grievances on both sides; but there is now rapidly accumulating evidence of an earnest desire to reconcile outstanding differences, to the mutual satisfaction of both parties. It daily becomes more apparent that a community of interest exists between employer and employed, and nothing is so much needed to make it really effective as mutual confidence and a common understanding on essential details. A community of interest implies first of all the location, and then the removal, of all avoidable causes of friction.

Problems of the Future.

Whatever illusions the employers and employed of this country may suffer from, it is to be hoped that nobody will cherish the illusion that in the future industry will flourish by adhering to the haphazard methods of the past. British industry to-day stands confronted with the chance of a lifetime; and if only an intelligent policy can be agreed upon, the future is secure. Happily, the Government realize that the time is now opportune for a comprehensive review and discussion of the whole subject; and the scheme of National Councils, District Councils, and Works' Committees is an earnest of their intention to deal fully with the various aspects of the many problems involved. It is a healthy sign that the proposed bodies are not to confine their discussions merely to grievances; but there is just the danger lest the element of professionalism should creep in and dominate the proposed organizations.

The Sub-Committee of the Reconstruction Committee has certainly outlined an ambitious programme; but the chief thing to guard against is the development of academic discussions redolent of the debating society. Practical discussion of the many aspects and numerous details of the reconstruction of industry is eminently desirable; and plenary powers are essential, since it would surely be expecting too much of busy men to discuss plans, and formulate schemes, with all their ramifications, unless they were also empowered to put them into operation. Assuming, however, that duly-appointed representatives of both employers and employed jointly agreed to adopt a given scheme in relation to a particular subject, unswerving loyalty to the scheme should be the order of the day, with a view to reaping all the advantages involved. Viewed from this standpoint, the lengthy list of subjects for negotiation referred to by the Reconstruction Sub-Committee cannot fail to produce some startlingly beneficial results.

STOPPING AND RE-STARTING A GAS-WORKS.

Experience at Angers, France.

A further communication to the one-day congress of the Société Technique du Gaz en France dealt with the precautions which were taken by the works at Angers (Maine-et-Loire) in the circumstances of a compulsory cessation of gas making for a period of seven days, in consequence of total lack of coal. The supply of gas was stopped simultaneously with the cessation of carbonization; customers being given two days' notice by proclamation by the municipal authorities and in the Press.

The plant consisted of eight batteries of horizontal retorts, 6m. (20 ft.) in length, heated on the Lachomette recuperative system, and producing about 4500 cb.m. (159,000 c.ft.) of gas per day. The hydraulic mains were independently connected to the pipes from the retorts, each by a flap-valve with outside screw adjustment. On the completion of the carbonization of the charge, the hydraulic mains were completely filled with water, and the valves closed. The coke was kept in the retorts, and the latter left sealed. The dampers for the primary and secondary air were closed, and that for the chimney of the furnace bench was lowered. The furnaces were then maintained at a much lower degree of heat by supplying them with coke in quantity about half that employed in full working. At the time of the stoppage the gasholders contained about 10,000 cb.m. (353,000 c.ft.) of gas. The inlet valves were left open so as to maintain a free passage from the scrubbers, washers, and other works plant. The opportunity was taken to clean the two works meters thoroughly, and to renew the material in a large purifier, which was then left open.

The town pipes, to a total length of 150 kilometres (93 miles), are supplied by a works main of 400 mm. diameter (15¾ in.), which encircles the chief part of the town; the whole supply system having a capacity of about 1200 cb.m. (42,400 c.ft.) The average difference of level between the works and the higher part of the system is 25 m. (82 ft.). The districts served by the works include a low-lying quarter, on the banks of the Maine, of 20,000 population; the principal quarter, of 40,000 inhabitants, on the slope of a hill; and a higher district, of 30,000 population. The latter is supplied with gas by six smaller branches from the chief main.

As it was seen that the stoppage would be for a short period, and in view of the comparatively large quantity of gas in the holders, the inlet valves from the works were not closed. Efforts were made to maintain a pressure of 3 mm. (1-10th in.) at the lowest point of the system. A recording manometer was fixed there, and the daily records used to follow the fluctuations in pressure. While a pressure of 3 mm. was kept up at the lowest point, the manometers in the highest part of the system registered 25 to 28 mm. (10-10ths to 11-10ths). Consumers had been requested to close the taps attached to all burners and meters; but the consumption of gas by those in the highest quarter gave rise to further loss from the mains which was estimated at 1200 to 1500 cb.m. (42,400 to 53,000 c.ft.) per day. On the sixth day of stoppage, it was found that the manometer in the lowest part of the system had registered the occurrence of 10 mm. (4-10th in.) vacuum during two hours. In view of this disquieting observation, and of the continued use of gas in defiance of the explicit prohibition, it was decided to resume working on the following day on the strength of the delivery of a very inferior consignment of coal from a Channel port.

In starting work again, the primary-air dampers were first opened; then those of the secondary air. The gases ignited at the burners without accident. The normal temperature of the furnaces was obtained only after 48 hours. The water in the hydraulic mains was brought back to its usual level, the gas-valves were opened, and ordinary working re-started. The purifier and one of the works meters, referred to above, were taken into use 36 hours later.

Consumers were advised of the resumption of operations by a widely distributed notice, which was issued for the purpose of indicating the means to be taken for the avoidance of accidents. All the burners used in the public lighting service had been carefully closed before the stoppage. About one-fourth of these, in different parts of the town, were re-lighted during the night preceding the re-starting, after having slightly increased the pressure at the works. The resumption of the supply of private consumers was attended with no ill-effects, except that the consumption on the first day was less than one-third of the normal—probably as the result of fear of accidents against which customers had been cautioned. The general conclusion from the experience at Angers is that, while the present difficulties in France in maintaining a regular supply over a system of nearly 100 miles are very great, the difficulties and danger of entire cessation are so much greater that the latter course is to be avoided if in any way possible.

Utilization of Peat and Brown Coal.

Now that it is possible to convert inferior fuels (such as peat and brown coal), with a relatively high degree of efficiency, into gas by generators and to make practical use of them as sources of power, the interest in them is increasing. In Northern Germany, where water power is not easily available, the high and low bogs are, it is said, "destined to furnish the fuel needed for the generation of electricity." The experiences of the overland power plant in the Auricher Wiesmoor have conclusively proved that with a peat consumption of 2 kilos (4·4 lbs.) per KW.-hour the peat bogs are "an economically useful source of power of great extent and duration."

Irish Association of Gas Managers.—The annual meeting of the Association is fixed for next Tuesday, in the Council Chamber, City Hall, Belfast, under the presidency of Mr. A. S. Brook, of Lisburn. In addition to the formal business and the address of the President, there will be a discussion on the formation of a Commercial Section, to be introduced by Mr. T. J. Reid, of Ballina; and two papers are to be read—one by Mr. F. G. Ambler, on "Intermittent Vertical Retorts for Medium-Sized and Small Gas Undertakings," and the other by Mr. P. J. Philpott, of Mallow, on "Exceptional Difficulties Experienced in Administration." There will be a break in the proceedings for light refreshments, on the invitation of the President; and in the evening the annual dinner will take place at Ye Olde Castle Restaurant. By permission of the Gas Committee and Mr. J. D. Smith (the Engineer and Manager), the members will be able to visit the Belfast Corporation Gas-Works on Tuesday afternoon, after the session is over. For the following day an excursion has been arranged to Newcastle, co. Down.

MANUFACTURE OF NITRATE OF AMMONIA BY ELECTRIC POWER AT COKE-OVEN PLANTS.

By E. Kilburn Scott.

[Extracts from a Paper read before the Coke-Oven Managers' Association at Sheffield, July 28.]

The author, in the course of his communication, suggested that, instead of the ammonia of coke-ovens being made into sulphate, it should be turned into nitrate of ammonia, which is a more valuable product per unit of combined nitrogen—the dilute acid required for the purpose to be made from air in arc-flame furnaces, with energy generated by the surplus gas or waste heat of the coke-ovens. The opening portions of the paper were as follows.

Whenever reference is made in papers or articles to the bye-products of coal, utilization of the ammonia is always assumed to be as sulphate of ammonia. In order to make this compound, sulphuric acid has to be purchased at prices which are fixed by the Acid Associations; and, further, it has often to be carried to considerable distances, which adds to the expense. In peace time, there is usually plenty of acid; but since the war it has been very scarce, owing to so much being required for reacting with Chili nitrate, to produce nitric acid by the ordinary Valentiner method, universal in this country.

By the purely chemical process, about 30 p.ct. of the sulphuric acid comes away as acid sodium sulphate mixed with sodium sulphate after each charge—the mixture being called nitre cake. In order, in some measure, to make up for the scarcity of acid, nitre cake is used in various industries—for example, to remove oxide or scale from metals after they have been annealed; for extracting grease from wool suds and other uses in the textile trades; for mineral water factories, &c. Nitre cake has also been tried for mixing with acid to make sulphate of ammonia; but it is hardly suitable, because of the considerable admixture of sodium sulphate. The position as regards sulphuric acid has grown steadily worse, because of the difficulty of obtaining sufficient sulphur and pyrites with which to make the acid, and also the difficulty in finding wagons, &c., with which to transport raw materials and finished acid. This paper proposes to show that manufacturers of coke can easily turn their ammonia bye-product into nitrate by means of acid of their own manufacture, and also that by making their own acid they become entirely independent of the Acid Associations, who have for so long controlled the supplies in this country.

The nitric acid required for nitrate of ammonia may be very dilute—of (say) 25 to 33 p.ct. strength; and it is easily and cheaply made from the air by electric power. This process is not new, because nitric acid has been made from air on a very large scale for many years in Norway, Italy, and France. Further, one of the most striking scientific developments of the war has been the way in which Germany, by the fixation of atmospheric nitrogen, has become entirely independent of Chili nitrate and sulphuric acid supplies.

Atmospheric nitrogen may be fixed in two ways—first, as ammonia; and, secondly, as nitric acid. In order to fully appreciate these methods, it will be useful to set out the various ways of making the two compounds.

Ammonia.

Ammonia can be made: (*a*) As a bye-product in the manufacture of coke in regenerative and in waste-heat ovens. (*b*) As a bye-product in the manufacture of lighting and heating gas, for town supply. (*c*) As a bye-product in the Mond process for production of power gas from slack coal. (*d*) As a bye-product in the application of the Mond process to the production of power gas from peat. (*e*) As a bye-product in connection with distillation of bastard and lignite coals. (*f*) As the direct product by the action of superheated steam on calcium cyanamide, which latter compound is obtained by fixation of atmospheric nitrogen with calcium carbide. (*g*) As the direct product of the synthetic combination of atmospheric nitrogen and of hydrogen in the presence of a catalyst, by the process due to Prof. Haber.

When ammonia is obtained as a bye-product of the distillation of coal, the cost may be, as in the case of most bye-products, only a little above the interest charge on the recovery plant, *plus* the cost of operating same. It certainly is not correct to arrive at the cost of bye-product ammonia by deducing the value from the market price of sulphate of ammonia. About £30 a ton, or 3¼d. per pound, is quite high enough to take for pure ammonia; but the proposal to make nitrate of ammonia at coke-ovens would still be a good commercial proposition, if the ammonia was at a higher figure.

As a comparison, it is of interest to determine the cost of ammonia made from calcium cyanamide. As the cyanamide and the carbide from which it is made require electric energy, clearly the rate for electric power is a factor. We may assume that ⅛d. per unit, which for 8000 hours a year is a little over £4 per KW.-year; and at this rate the cost of the cyanamide may be taken at £10 per ton. To produce a ton of ammonia requires about 4½ tons of cyanamide, containing 20 p.ct. of nitrogen; and therefore the cyanamide will cost £45. In addition, there are certain other manufacturing costs; but, to cut it short, we will take a total of £50 a ton, or about 5¼d. a pound.

It would be interesting to know the cost of synthetic ammonia as made by Haber's method from pure nitrogen and pure hydrogen. Although we can arrive at the costs of the two gases, the other data are not available, because the process is only in use in Germany.

Nitric Acid.

Nitric acid can be made in any of the following ways: (*a*) The action of sulphuric acid on sodium nitrate or Chili saltpetre. This method is practically universal in this country. (*b*) The fixation of atmospheric nitrogen by the direct process, using electric arc flames. This method is employed on a very large scale in Norway, and is in use in Italy, France, Germany, and Austria. A factory is to be built in Manchester. (*c*) Oxidization of ammonia in the presence of a catalyst, by the process due to Prof. Ostwald. This method is employed on a large scale in Germany, and is also in use in Italy, France, and Belgium. A small plant has been built at Dagenham Dock, in Essex.

When discussing the cost of nitric acid, one method is to assume it as of 100 p.ct. purity, though in practice, of course, there is no such pure acid; and for the manufacture of most compounds, quite low percentage strengths will do. When made from Chili saltpetre costing (say) £10 a ton, which was approximately the price before the war, the cost of pure acid may be taken at £20 a ton, or (say) about 2·15d. a pound. The price of Chili nitrate is now nearer £25 a ton; and as the cost of sulphuric acid has also gone up, and everything else in proportion, the present cost of nitric acid must be upwards of £50 a ton.

In order to compare the cost of nitric acid as made by the direct arc-flame process, I propose to take the cost of electric energy at ⅛d. per unit, or about £4 a KW.-year of 8000 hours. Assuming a yield of 200 grams of 33 p.ct. acid per KW.-year, which is equivalent to 66 grams of pure acid, the cost of pure acid can be shown as about £13 10s. a ton, or 1·44d. per pound.

The oxidization of ammonia into nitric acid depends on the cost of the ammonia; and if we take it at £50 per ton, the cost reckoned as pure acid should be about £25 a ton. It is to be doubted very much, however, if it can be made at this figure, owing to the lack of experience of the process, and the very high cost of the catalyst—platinum—which is continually having to be replenished.

Nitrate of Ammonia.

We have now to consider the various methods for making the ammonia and the nitric acid into nitrate of ammonia. As it happens, several methods are in use, which would not be commercially possible under ordinary peace conditions; but the war demand is so great for explosives, that it does not appear to matter what any method costs. The following are briefly the various systems.

1.—By direct mixing of strong ammonia with strong nitric acid made from nitrate of soda. This method is employed by Chance and Hunt.

2.—By the reaction of sulphate of ammonia with calcium nitrate or nitrate of soda. This method is employed by Brunner, Mond, & Co.

These are purely chemical methods, whereas the two following depend on the use of catalysts.

3.—By the combination of ammonia made from calcium cyanamide with nitric acid made from the ammonia by a catalyst. This method is employed in France and Germany; and a factory has been built at Dagenham Dock, Essex.

4.—By combination of ammonia made by the synthetic or Haber process, with nitric acid made by the oxidation of ammonia by a catalyst. This method is employed on a large scale in Germany.

There is finally the purely electrical method with which the paper is mainly concerned.

5.—By direct mixing of ammonia liquor, of about 25 p.ct. strength, with dilute nitric acid made from the air by the direct arc-flame process.

Power from Coke-Ovens.

The scheme proposed is that gas from regenerative coke-ovens, or the steam raised by waste-heat ovens, should be utilized in an electric power house built by the coke-oven proprietor, and some, if not all, the energy be employed for making nitric acid from air—this acid to be then combined with ammonia from the ovens to make nitrate of ammonia. In other words, it is proposed that coke-oven proprietors should manufacture nitrate with home-made nitric acid, instead of as at present making sulphate with purchased sulphuric acid. Power may be obtained by using the surplus gas from regenerative ovens in gas-engines.

Though a battery of fifty coke-ovens will give 2000 to 2500 KW.,

I propose to deal with figures for a power-plant capable of generating 1000 KW. continuously, and an electro-chemical factory to utilize this amount of energy. For a total of 1000 KW., the best size of generating unit to adopt is 500 KW.; and it is advisable to have three such units—one of them being spare. On this basis, the approximate cost of a power-house plant to utilize coke-oven gas in direct-coupled gas-engines would be £28,000; or of plant to utilize waste heat to raise steam for turbines, £29,000. Electric power houses are now so standardized, and the installation and running so simple and straightforward, that coke-oven proprietors need not hesitate to instal their own plant. They would find it more profitable to themselves utilize the surplus gas and heat, than to sell it to others to exploit. Leaving a fair margin of profit, electric energy ought to be supplied from such a power-house at $\frac{1}{8}$d. per unit. At this figure, 1000 KW. for 8000 hours a year would bring a return of

$$\frac{1000 \times 8000}{8 \times 240} = £4166$$

From this must be deducted the standing charges, labour, and stores, and also any figure that the coke-oven proprietor feels justified in charging for the gas or waste heat. As he is selling to himself, it is merely a matter of book-keeping.

The Nitrate Plant.

The author then proceeded to describe the apparatus required to fix atmospheric nitrogen as nitric acid; the arc-flame furnace referred to being one specially developed by him for the purpose. It differs from those in use abroad in that it is a self-contained three-phase unit, and as such has various advantages.

The manufacture of nitrate of ammonia is carried out by running the dilute nitric acid for the absorption plant into a closed iron tank containing ammonia solution in which the ammonia is at about 25 p.ct. strength. Acid is slowly added to a large volume of liquor, and an agitator mixes them together; the heat of combination being carried off by cooling-coils, as well as by circulation of air. The addition of acid continues until nearly all the ammonia is taken up, leaving a slightly alkaline reaction. The ammonium nitrate solution is then run through a filter into vacuum pans, where evaporation is effected by steam-coils at a pressure of 20 mm. of mercury.

When nearly all the water has been evaporated, the solution passes into long troughs slightly inclined and subjected to a rocking motion. The nitrate forms into small crystals with no enclosure of liquor; and after the crystals have been dried in a hydro-extractor, they are placed in bags or barrels ready for market. The nitrate is absolutely pure.

In the above it is mentioned that the ammonia is brought up to 25 p.ct. strength, and that concentration is absolutely necessary in order to reduce the water when the solution has to be carried any distance. Nitrate of ammonia can, however, be made with solution of much less strength. In fact, it has been demonstrated at Bristol that nitrate can be made direct from ordinary gas-works liquor, by acting on it with dilute nitric acid. Of course, when made in this way, the nitrate is not so pure as when made by the other processes; and a great deal of evaporating plant is necessary.

Estimate of Cost.

The yield of acid may be reckoned at 1½ tons of 33 p.ct. nitric acid per KW.-year—that is to say, 1500 tons from a plant utilizing 1000 KW. This is based on a yield of 66 grams of concentrated acid, or 200 grams of 33 p.ct. acid per KW.-hour. As a matter of fact, greater yields are obtainable; but the figure named is sufficient for the purpose, and to show the sequence of the calculations.

Assuming that the electro-chemical plant costs £8000, and utilizes 1000 KW. for 8000 hours per annum at $\frac{1}{8}$d. per unit, the expenses are:

Electric energy	£4166
Depreciation, 10 p.ct. on £8000	800
Salaries, wages, stores, royalty, &c.	1790
	£6756

This, for an output of 1500 tons, gives £4 10s. per ton of 33 p.ct. nitric acid, or the equivalent rate for pure acid is £13 10s. For a plant to utilize ten times the amount of energy, the cost should be well under £4, even taking the above figures for the yield.

The cost per ton may now be set out:

1500 tons of 33 p.ct. nitric acid at £4 10s.	£6,750
125 tons of pure ammonia at £30	3,750
	£10,500

As this produces 635 tons of ammonium nitrate, the cost is £16 10s. per ton.

In addition to ammonium nitrate, there is the sodium nitrate-nitrite. This may be assumed at 1-10th ton per kilowatt-year; and it is readily saleable. It should be worth £1500 a year.

Before the war, nitrate of ammonia made by the electric process in Norway was sold in large quantities at £28 to £30 a ton. Properly speaking, there is no quotation now, because all the make is taken by the Government for explosives. Its minimum price may, however, be fairly taken at double the above figure.

Uses of Nitrate of Ammonia.

A number of uses of nitrate of ammonia are cited in the paper, among them, the author believes that after the war it will come into use as a fertilizer. As a matter of fact, he said, the expert gardeners of France and Belgium have used it for intensive cultivation for some years. When sulphate of ammonia gives up its nitrogen for plant food, it leaves the constituents of sulphuric acid in the soil; also, when Chili nitrate gives up nitrogen, sodium is left behind. Both these are detrimental; and it is therefore usual for farmers to rest the land occasionally from artificial fertilizers. The chemical symbol for ammonium nitrate—namely, NH_4NO_3—shows that the nitrogen exists in part as ammonia-nitrogen, as in sulphate of ammonia $(NH_4)_2\,SO_4$, and also in part as nitric-nitrogen, as in Chili nitrate $NaNO_3$. It will be readily appreciated that by having its nitrogen in both these forms, nitrate of ammonia is an all-round fertilizer. Also it has the advantage that, when it gives up its nitrogen to plants, only the constituents of water are left behind.

The principal objection to nitrate of ammonia is that it is deliquescent; but this is likely to be overcome, and careful experiments to this end are now being conducted.

MELTING POINTS OF REFRACTORY MATERIALS.

The melting-point of fire-brick is stated by Mr. W. H. Barr, in "Industrial Engineering," to be the lowest observed temperature at which it begins to exhibit transition from a rigid towards a fluid condition. But the crushing strength cold, behaviour under load when heated, and resistance to fluxes, may also be regarded as important practical considerations. The melting-points of forty-five samples of fire-brick, clay, bauxite, silica, magnesia, and chromite, were determined in an electric furnace, the temperatures being measured by an optical pyrometer.

Common fire-brick is made of clay of which the essential is $Al_2O_3\,2(SiO_2)$. According to Shepherd and Rankin, this compound cannot exist at temperatures approaching the melting-point, but is decomposed into $Al_2O_3SiO_2 - SiO_2$. All commercial silicas melt at as low as 1600° C., but possess so much viscosity that they do not change shape until a much higher temperature is attained. Kanelt obtained 1750° as the point at which they flowed distinctly. So the actual temperature of melting is very indefinite, but is more even with the finished silica bricks. Bauxite is an impure $Al_2O\,(OH_4)$, and when heated Al_2O_3 is formed, which melts at 2012°. But neither the material nor the brick made from it was found to approach that point. A sample of the mineral melted at 1820°; the centre of the nodules cintering at 25° lower; and the bauxite clay at 1790°. A brand of magnesia brick melted at 2165°; and the melting-point of pure MgO is doubtful, but presumably higher, as the brick was of a dark brown colour, and contained iron. Among the pure materials tested were kaolin, melting at 1740°, silica at 2010°, and chromite at 2180°.

Batley Gas Accounts.

The accounts of the Batley Corporation Gas Department for the year ended March 31 show a net profit of £70, as against an amount in the previous year of £1843, and in the year 1913-14 of £4587. During the last-mentioned year, the department yielded £4750 in aid of the rates. This year only £50 has been taken. In the past ten years the department has yielded net profits amounting to a total of £37,518, and has given £42,764 to the rates. Whereas in 1914-15 the sale of gas was nearly 190,000,000 c.ft., it fell in 1915-16 to 172,111,600 c.ft. During the past year, the sales have been only 153,102,000 c.ft. The price of gas during the past year was 3s. 1d. and 3s. 5d. per 1000 c.ft., whereas ten years ago it was only 2s. 1d. The past year's income, owing to the high prices, rose to £38,149—a record for the department; but the expenditure advanced to £27,774, not including £10,304 loan charges. The cost of coal increased by nearly £1800, as compared with the previous year. Repairs and maintenance cost £1250 more; the outlay in this direction having been £2800, much of the plant being in need of renewal. There is a good deal of local criticism of the Corporation's policy in having in past years taken such big sums from the gas profits to the relief of the rates.

Melbourne Metropolitan Gas Company.—Messrs. John Terry & Co., of No. 7, Great Winchester Street, E.C. (London Agents for the Metropolitan Gas Company of Melbourne), have been advised by cable that the profits of the Company for the half year to June 30 last were £95,255. A dividend of 6s. 6d. per share has been declared for the six months; a sum of £30,000 has been transferred to the reserve fund; and the balance of £60,509 carried forward. Dividends will be payable in Melbourne probably on the 1st inst.

Irish Peat for Gas-Plant Needs.—It is expected that one of the questions to be investigated by the Committee just appointed by the Government to inquire into Irish peat resources will be that of finding how far such peat would suit the needs of gas plant. A member of the Committee has pointed out to an interviewer that the difficulty with peat for power production is its bulk, as compared with coal, in proportion to heat value. One gas plant, however, he added, is using peat in Portadown, and is working well, although advantage is not being taken of the bye-products. In Germany, gas plants working on peat are now producing power of over 3000 H.P. The Irish peat bogs are very extensive, and at present peat moss litter and peat dust for packing and mixing with molassine feeding stuff are the chief industrial uses to which the peat is put in that country.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Gas Light and Coke Company and Standard Price Alteration.

Sir,—The decision of the Directors of the Gas Light and Coke Company not to hold a half-yearly meeting or to issue a half-year's statement of accounts is, no doubt, dictated by a praiseworthy desire for economy, reinforced by the difficulties caused by a temporary or reduced staff. It is none the less to be regretted, especially having regard to the considerable reduction in dividend and the apparent absence of any serious endeavour to get the standard price adjusted in accordance with the alterations in the basic factors upon which it was originally fixed.

It will, I think, be generally admitted that the sliding-scale principle is the best that has yet been devised for combining the interests of shareholders and consumers. But it is essential, if this aim is to be reached, that the standard price shall be a fair one; and it is obvious on the face of it that, owing to the change in economic conditions, this is no longer the case.

Why is no attempt being made adequately to deal with this injustice, which is causing so much unnecessary hardship to shareholders? Are Directors afraid of being charged with profiteering? If so, surely these fears are groundless. The essence of such a charge is that advantage is being taken of conditions created by a state of war to make an abnormal rate of profit; whereas shareholders in the companies affected would be happy to receive the very moderate pre-war rate of return on their investment, notwithstanding the general rise in the value of money that has since taken place.

Let us look at the facts. The dividend for 1913—the last complete year previous to the war—was at the rate of £4 17s. 4d. p.ct. This has now been reduced to £3 14s. 8d. p.ct., owing to an increase in the price of gas of 10d. To provide a sufficient amount to pay the pre-war rate would require a further increase in price of a little over 1½d. per 1000 c.ft.

I would not for a moment minimize the importance of another 1½d. on the price of gas—small as this is as compared with the total rise due to the increased cost of manufacture. And it may be that commercial considerations would preclude any further increase, although such a statement would require considerable proof. But if it were so, of course, the shareholders would of necessity have to put up with the reduced dividend whether the statutory restriction existed or not. If, on the other hand, it is due to a standard price working unfairly, it would seem to be the clear duty of the Directors to take steps to get it altered; and the idea will present itself that if what is now generally referred to as "ginger" is wanted, it might have been provided by the abandoned shareholders' meeting.

Arthur Valon.

5, *Victoria Street, Westminster, S.W.* 1,
Aug. 2, 1917.

Determining the Gas Production Goal.

Sir,—In your editorial of last week, headed "Determining the Gas Production Goal," there is strong evidence that you have unwittingly misinterpreted some of my remarks on gas quality made before the Society of Chemical Industry the previous week. The use of the term "Industrial Fuel" was, I feel, an appropriate one to the Society.

My point, *re* railway companies and blue water gas, was not that any gas engineer would be desirous of supplying blue water gas alone, but that the railways, in concentrating on the question of low inerts, are in effect demanding a higher calorific value per cubic foot.

Your reference to the "broader thought on the subject" of lower calorific value—which has come to Birmingham—is, however, the important misinterpretation, or misreading, of my remarks. In the first place, any opinions I have expressed are solely intended to represent my own views, and not necessarily Birmingham's. Secondly, my reference to the lack of economic or scientific reasons for the adoption of a reduced calorific value, and the opinion I expressed—that, without extraneously supplied inerts, it was impossible to produce, with present methods of carbonization, a gas of 500 B.Th.U. gross from the coal alone—should, I now realize, have been amplified.

I am convinced that it will pay the gas industry to maintain an average calorific value of about 550 B.Th.U. gross.

It has yet to be proved that low-grade gas of 500 B.Th.U. gross is cheaper than that of 550 B.Th.U. gross, assuming that the former has to be at least 10 p.ct. cheaper than the latter, to put the two gases on a comparable basis.

I am confident a very strong case will be made out by engineers in the future for low inerts and higher calorific value than the present accepted standard; and it will be on the grounds of cost production—not cubic feet, but of heat energy.

I am sure you will welcome this explanation of my views on this matter. It is too important a subject to be left open to any misunderstanding.

E. W. Smith, Chief Chemist.

Central Laboratory, Nechells Gas-Works,
Birmingham, Aug. 1, 1917.

[Welcome is given to Mr. Smith's explanation, because we agree that the subject principally referred to in it is one that should not be left open to any misunderstanding. We have not seen the full text of our correspondent's paper; and we cannot admit that we have "misread" his remarks as sent to us by our representative at the meeting. We may have misinterpreted his intentions; but he frankly confesses that he now realizes the opinion he expressed on the subject of gas production and calorific power should have been amplified. He mentioned in the paper that variations of quality in gas supplies are bad; and that so far [this is according to the report sent by our representative] it had not been possible to produce from the average coal, and using the usual methods of carbonization, 500 B.Th.U. gas, though this quality had been turned out by a number of gas-works. The argument strikes us as being an extraordinarily good one for, at any rate—without entering just now upon the question of the economy of blue water-gas dilution—preventing variations of quality in the supply, and for ensuring a good combustible gas, by having a standard fixed which can be economically maintained from available coal supplies without foreign assistance. There is here an economic question for determination. It will be observed that, in our reported remarks, there is no mention in the sentence referred to of "extraneously supplied inerts;" and even now there is, in the construction of the amended statement in Mr. Smith's letter, a little ambiguity: "Without extraneously supplied inerts, it is impossible to produce, with present methods of carbonization, a gas of 500 B.Th.U. gross from coal alone." Of course, what Mr. Smith means is not that it is impossible without extraneously supplied inerts to produce, &c., but that unless extraneously supplied inerts are kept out of the gas, it is impossible, &c. Mr. Smith is a member of the Gas Lighting Heating, and Ventilation Research Committee, whose new work was described by Professor Cobb at the meeting of the Institution in June as "the determination of the comparative efficiency in use of gas of different grades; so that, now that we are coming to a time of reconstruction, the legal and historical influences which have mainly determined gas standards should be set on one side in favour of more rational and scientific influences, and that we should investigate the comparative efficiency of gas standards, in order to obtain some definite and reliable figures for the guidance of all concerned." Mr. Smith, as a member of the Committee, enters upon the work already "convinced" that it will pay the gas industry to maintain an average calorific value of about 550 B.Th.U. gross, and "confident that a very strong case will be made out by engineers in the future, for low inerts, and *higher* calorific value, than the present accepted standard; and it will be on the grounds of cost production—not cubic feet, but heat energy." However, we welcome this explanation of Mr. Smith's personal views—quite apart from his membership of the investigating Committee who have these questions in hand, though this fact adds additional interest to the opinions he has expressed.—Ed. G. J.]

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Willey & Co., Exeter.

Mr. W. Thorne asked whether the Minister of Munitions was aware that Messrs. Willey & Co., of Exeter, was a controlled firm; that they had not paid their workpeople the advances granted in the engineering trade by the Committee on Production; that lads of eighteen and sixteen years of age were only receiving wages varying from 16s. 8d. to 10s. 6d.; that women workers had been kept short of eight weeks' back-money at the rate of 4s. per week in respect of advances granted by statutory orders; and if he would take action in the matter.

Mr. Kellaway, in reply, said complaints on the first and third points raised had already been received and were being investigated by the Department. He was causing inquiry to be made into the second point also.

Clerks in Electric Light and Gas Offices.

Sir H. Dalziel asked the President of the Board of Trade why so many clerks of military age in the offices of electric light and gas companies were allowed to be badged and classified by the companies themselves as skilled workers; whether these men (many of whom are in Class "A") were engaged on clerical work which women could do; and whether, in view of the pressing demand for men by the military authorities, he would take the necessary steps to have debadged all men of military age employed by electric lighting and gas companies as clerks.

Mr. Kellaway, replying for the President of the Board of Trade, said that all war service badge certificates were withdrawn on May 7 last. The protection from recruitment of the clerical staff of electric lighting and gas companies was dealt with in some cases under the Schedule of Protected Occupations; in others, by local tribunals. The schedule provided that in electrical and gas undertakings certified by the Ministry of Munitions under the Munitions of War Act, technical staff and clerks possessing high technical knowledge should be protected from the age of 25 upwards, and other clerical staff from the age of 32, or below that age if they were not fit for general military service, category "A." He was not aware that any category "A" clerks below these age limits were being protected in undertakings dealt with under the schedule.

The Secretary of the General Union of Braziers and Sheet Metal Workers (Bolton Branch) has intimated to the Bolton Corporation Gas Committee that an advance of wages of 3s. per week for men and 1s. 6d. per week for apprentices under eighteen years of age has been arranged between the Sheet Metal Employers' Association and the Joint Committee of the Union. The advance has been approved by the Committee on Production, to come into operation on the 1st inst.

REGISTER OF PATENTS.

Gas-Furnaces.—No. 107,264.

Davis, H. N., and Twigg, W. R., of Luton.

No. 9545; July 6, 1916.

In carrying out this invention in gas-fired furnaces for heating steel billets or ingots, crucibles, or the like, the patentees provide a vertical one of cylindrical shape with an inner combustion chamber adapted to surround the billets or crucible, and having walls converging by steps or tapering towards their upper end—thus giving the chamber a substantially frusto-conical form. The furnace is fired with a self-supporting combustible mixture fed through a tangential opening in the furnace at the lower or enlarged end of the combustion chamber. The billets or ingots are arranged slightly above the floor level, so as to leave a space between them and the inner converged wall of the chamber—an arrangement which causes the products of combustion in rising to be forced inwards towards the centre as they rise and until they escape from the upper end of the combustion chamber through the relatively narrow annulus left between the billet and the upper end of the chamber.

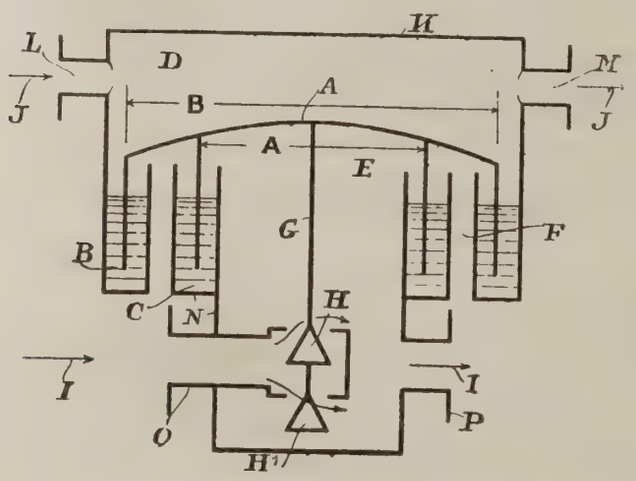
In order to increase the efficiency of the furnace, it is provided with a removable upper fire-brick cover plate which partially closes the upper end except for a central aperture, over which is a baffle (also of fire-brick) which has a reverberatory effect upon the upper end of the billet being heated.

Regulating Fluid Pressures.—No. 107,393.

Davis, H. N., and Twigg, W. R., of Luton.

No. 4784; March 31, 1916.

This invention relates to valve apparatus for automatically regulating mixtures of coal gas and air by means of a float or bell chamber actuated so that increases in the pressure of one fluid produce proportionate, but greater, increases in the pressure of the other fluid—the apparatus being so loaded that the ratio of the pressures of the two fluids is not maintained constant or uniform, but automatically varies as the pressures increase.



Davis and Twigg's Fluid Pressure Regulator.

A sectional diagram of one form of apparatus in accordance with the invention is given. It shows a self-loading governor comprising an inverted bell A, having two depending concentric flanges or sides adapted to dip into liquid seals B and C, one of which seals a chamber D on the upper or outside of the bell, and the other a chamber E on the inner or under side. The intervening annular space F between the two sealing flanges is open to the atmosphere. Attached to the bell is the spindle G, of a balanced double-seated or other suitable valve H H¹, through which the air passes as indicated by the arrows I. The static pressure of the air after passing this valve is allowed to exert itself on the underside of the bell chamber E. The static pressure of the gas, the path of which is indicated by the arrows J, acts upon the upper or outside bell chamber D. Thus the whole upper surface of the bell is subjected to the depressing effect of the gas pressure while only the inner underside surface of it is subjected to the elevating pressure of the air after passing through the valve, and that part of the under surface of the bell between the two depending concentric flanges is exposed to atmospheric pressure.

Consequently, the area B depressed by the gas pressure will be greater than the area A supported by the air pressure—the relative areas being dependent upon the relative diameters of the concentric flanges on the bell. For instance, assuming that the area of the bell is 1·5 times the area of the bell within the inner flange, and that the bell when atmospheric pressure is acting in the outer gas-chamber D is balanced by an air pressure in the air-chamber E of 5-10ths w.g., then if the gas pressure in the chamber D on the top of the bell is 10-10ths, the additional pressure necessary in the chamber E beneath the bell to counteract this is 15-10ths. Therefore, the total air pressure necessary to support the bell will be 15-10ths + 5-10ths = 20-10ths. Now assuming that the gas pressure rises to 20-10ths, the supporting pressure beneath the bell will then have to be 30-10ths + 5-10ths = 35-10ths. It will thus be seen that a rise of 10-10ths in the gas pressure will result in a rise of 15-10ths in the air pressure, or a rise in the air pressure of 1·5 times the rise in the gas pressure.

In the construction shown, the gas-chamber D is formed by a casing K provided with inlet and outlet connections L and M, while the chamber E is formed by a casing N also provided with similar inlet and outlet connections O and P.

Utilizing the Waste Heat of Gas-Engines, &c. No. 107,443.

Semmler, C., of Wiesbaden, Germany.

No. 10,403; July 24, 1916.

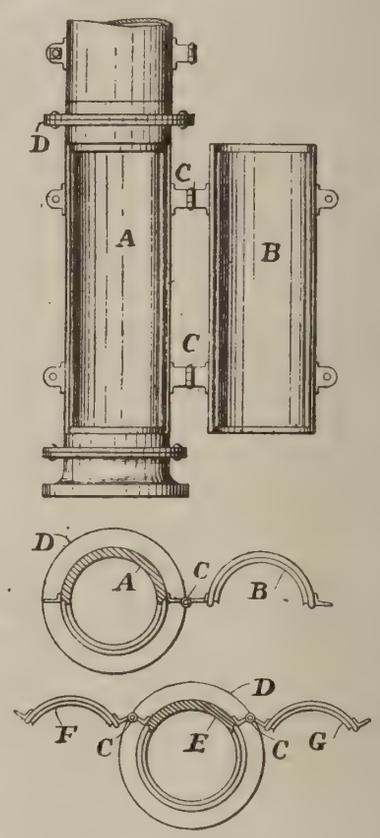
The claims for this invention are: 1.—A method for the utilization of the waste heat of gas-engines, or the like, according to which a circulating heat-conveying medium that does not readily boil, is heated without being subjected to additional pressure to a temperature below that at which it boils, and by this means, without itself evaporating, is rendered capable of heating in that part of the circuit at which heat is given off, either of generating steam or heating air to such an extent as to render them capable of performing work in extraneous apparatus. 2.—A form of carrying out the method according to which there is interpolated in the circuit a heat storage or accumulating plant for the reception of the hot cooling liquid, in order to balance the variations of temperature, due, on the one hand, to the irregular supply of heat and, on the other, to the varying amount of energy consumed. 3.—A form of carrying out the method according to which the limits of temperature of the circulating cooling medium are regulated by the amount of heat given off—it may be by varying the cooling surface or the temperature of the exterior cooling medium acting on it, by interpolating heat-dissipating devices, or by varying the rate of flow of the cooling medium.

Ascension Pipes.—No. 107,536.

Proctor, W. H., of Crook, co. Durham.

No. 805; Jan. 16, 1917.

The inventor proposes to make one or more of the lengths of an ascension pipe in two or three parts longitudinally, hinged together so as to open like doors, and expose the interior so that it is readily accessible for cleaning.



Proctor's Ascension Pipe.

An elevation is given of an ascension pipe divided into two parts, with the movable part thrown open; also a sectional end view. There is also a similar end view of a pipe divided into three parts.

The part A is supposed to be fixed, while B is turnable about vertical butt hinges C formed on lugs projecting radially from the sides of A B. On the outer sides are also radially projecting lugs adapted to be clamped together in pairs when the pipe is closed by screw bolts and nuts passed through holes or by some other suitable fastening. The rims of the two parts are reciprocally rabbeted, so that a beading on one rim fits into a groove in the other, and a convex rim into a concave recess. The sides of these grooves and beadings are slightly rounded, so as to allow for the circular sweep of the turnable part. The ends of the fixed part A have complete extensions, which carry flanges D adapted to be bolted to flanges of the adjoining lengths of pipe.

The description of the two-part form will, with obvious modifications, apply also to the case of the pipe divided into three parts. The turnable parts F G are connected with the fixed part E by hinges, and their opening sides are brought together when closed and the lugs clamped together as described.

LEGAL INTELLIGENCE.

WILTS COUNTY GAS COMPANY LIQUIDATION.

The issue of the report [reproduced on p. 199 of last week's "Journal"] of the Official Receiver under the liquidation of the Wilts County Gas Light and Coke Company, Ltd., of No. 14, Victoria Street, S.W., and Pewsey, Wilts., was followed last Wednesday by the statutory meetings, at the offices of the Board of Trade, of the creditors and shareholders interested.

The statement of affairs showed a total deficiency of £12,641, which was accounted for as follows: Rent, salaries, law costs, &c., £1039; Directors' fees, £595; dividends paid, £968; depreciation of property, £238; preliminary expenses, £1996—all of which have been written off in the Company's books. But in addition to this, the followlng items were brought into the account, which have not been written off in the books: Depreciation on property, £6652; and preliminary expenses, £1996.

After dealing with the proofs of debt lodged, the Official Receiver said the creditors and shareholders had already received a copy of his report on the case. It was not very nice reading, and no doubt most of them knew more about the Company than he did himself. It was the same story that he had met with in other cases in which small gas-works had been acquired at a low price, and then passed on to a company at an enormous profit. In every case that had come under his notice, there had been intermediaries, who received the profit derived from the promotion. He had not looked sufficiently into the case to know whether the profits made by the intermediaries had been properly disclosed to the shareholders, and whether the shareholders had consented to the profits being paid. It might be necessary to bring some claims against the promoters of the Company in regard to these profits. With regard to the debenture for £500, the bank's claim on it was only £81; and therefore there should be over £400 accrue to the estate from this source. He had been told by Mr. Judd, the Receiver, that the £500 would be forthcoming, because it was due from a rather better gas company than the present one. The point for the Liquidator to consider was whether he should take action against the promoters for a portion of the profits they had made out of the flotation; but, of course, he would be advised by Counsel before taking proceedings.

After further discussion, it was decided to leave the winding-up of the Company in the hands of the Official Receiver.

BIG HAUL OF GERMAN DYE PATENTS.

Something like 125 applications have now been made for licences to use German patents for coal-tar dyes. The most recent application was on Thursday last, when the Morton Sundour Fabrics, Ltd., of Carlisle, applied in the Patents Court for licences to use 29 of these patents. At the beginning of June, the same firm applied for licences to take eighteen other German patents of the same class. The patents are all of the anthracene series, including several intermediate products. Nine of these patents were lately applied for by British Dyes, Ltd., who have asked for, in all, between fifty and sixty German dye patents; while Messrs. L. B. Holliday & Co. have sought permission to use nineteen.

Mr. *A. H. Davies*, M.Sc., the Chief Chemist to the Morton Sundour Fabrics, Ltd., explained that the patents, as to fourteen or fifteen of them, were post-war issues belonging to the years 1914 and 1915, and gave better and up-to-date methods of manufacture. They were mainly for vat dyes; and in the field in which the Morton Sundour Fabrics, Ltd., were interested, the whole of the serviceable German productions had now been examined.

Mr. *James Morton*, a Director of the Company, stated that the dyes would be made by the Solway Dyes Company, of Murrell Hill Works—an offshoot of the applicant Company, established at the beginning of this month to take over their dye-making section. They were the first to make in this country the blues, yellows, browns, &c., of the indanthrene series and alizarine sapphirole.

The patents in the group now applied for belong to the Badische Anilin und Soda Fabrik, Leopold Cassella & Co., Akt. Ges. für Anilin Fabrikation, Meister, Lucius, and Bruning, and the Chemische Fabrik Griesheim-Elektron.

The Controller of Patents (Mr. Temple Franks) said he thought the licences should issue. The royalty would be, as before—2½ p.ct. on the completed product, and 1 p.ct. for the intermediates. It was desirable that the applicants should proceed with their manufacture at the earliest possible moment.

Lights at a Gas-Works.

The Hythe Bench last Tuesday dismissed a summons by which Mr. C. Towers, the Manager of the Hythe Gas Company, was accused of failing to subdue certain lights at the works. The light, it was said, came from the retort-house, which faces north, so that the flare could be seen from the sea. For the Company, Mr. Drake said the light came from the retort-house at times when the retorts were being charged and drawn. The Company used every conceivable means for ensuring that there should be no light showing, and no light did show towards the sea on the south or to the east or west. If the Bench convicted defendant, it would mean that gas production would be reduced by quite 50 p.ct., for the Company would have to stop making gas at night. When warnings were given, the gas-works was the first to be informed; and all lights were instantly extinguished and the work of production suspended. The Company did every possible thing that could be done; and the work had, moreover, gone on under the same conditions ever since the commencement of the war. Apart from Hythe, no gas company in England had ever been summoned for showing lights when the retorts were being drawn, with one exception. The exception was the Aylesbury Gas Company. But in that case, the work was alleged to have been continued after warning had been received in the town. It was necessary this work should proceed, as the bye-products were required for Government purposes; and it was only on the day preceding the Court that the Minister of Munitions was urging that all carbonizing plants at gas-works should be worked to the fullest extent, before any water gas, carburetted or uncarburetted, was manufactured. If the Bench convicted Mr. Towers, and thereby the Company, it would be impossible to carry on a work so important.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following report of the Directors (signed by the Chairman, Mr. Charles Hunt) will be presented at the half-yearly meeting of the proprietors next Friday.

For the third time since the commencement of the war, it has become necessary to raise the price of gas, this time by 3d. per 1000 c.ft. as from the meter-readings for the Midsummer quarter. The dividend payable under the sliding-scale will thus be reduced to £4 6s. 8d. p.ct. per annum, and the bonus to co-partners will disappear, since under the existing bonus scale this ceases when the price of gas governing the dividend exceeds 2s. 11d. per 1000 c.ft.—such price being now 3s. 1d.

The net revenue account shows that, including the balance of £13,681 brought forward from last half year, and after providing for debenture and other interest, the amount available for dividend is £41,981, out of which the Directors recommend the payment of statutory dividends (less income-tax) as follows: On the 5 p.ct. preference stock, 5 p.ct. per annum; on the 5 p.ct. ordinary stock, £4 16s. 8d.; on the 5 p.ct. West Kent ordinary stock, £4 16s. 8d.—leaving to be carried forward to next half year the sum of £14,193.

The exceptionally severe and prolonged winter, followed by continued scarcity of house coal, greatly stimulated the consumption of gas for heating and cooking. To this is mainly due the very notable increase of 17·1 p.ct. Coke sold well throughout the half year at previous prices. Ammonia products were all disposed of for home consumption. There was, and continues to be, an improved demand for tar.

Consequent upon the great increase in the output of gas and depletion of stocks, arrangements have had to be made for a much larger supply of coal during the current year than usually suffices. This has been a matter of grave difficulty. But enough has now been secured, subject to the approval of the Coal Controller.

The Directors have felt it incumbent upon them to protest strongly against the action of the Beckenham Urban District Council in charging upon the rates a deficiency incurred in the working of their electricity undertaking, and thus introducing—as regards this Company—rate-aided competition in a most objectionable form.

The Board of Trade have declined to accede to the application referred to in the last report, to extend the existing calorific power standard to the remaining one-fourth of the Company's gas supply, which continues to be governed by an illuminating power standard.

The accounts accompanying the report show that the total capital expenditure at the close of the half year (including the nominal amount added by conversion) was £1,416,395, or £29,690 more than the receipts—viz., £1,386,705, inclusive of the premium capital. A sum of £7117 was expended on capital account in the half year. The revenue from the sale of gas was £206,173; the rental of meters, stoves, and fittings produced £21,354; sales of residuals, £72,115; and the total receipts were £299,802. The following were the principal items of expenditure: Gas manufacture, £201,621; distribution, £31,002; management, £8246; rent, rates, and taxes, £10,049; and miscellaneous items bringing up the total to £269,476. Among the last-named items is an amount of £1261 charged on account of the co-partnership scheme, and another of £14,314 for war fund bonus and allowances The balance carried to the net revenue account amounts to £30,326, and there is available for dividend £41,981.

The statements as to working show that, under the supervision of Mr. S. Y. Shoubridge, the Engineer, 99,878 tons of coal were carbonized and 482,685 gallons of oil used in the half year. The quantity of gas made was 1,496,635,000 c.ft. (308,133,000 c.ft. of oil gas), of which 1,356,530,700 c.ft. were sold and 1,372,044,600 c.ft. accounted for. The residuals made were: Coke 62,423 tons; breeze, 27,382 yards; tar, 1,008,833 gallons—the make of sulphate of ammonia being 951 tons.

Alluding to what is the "objectionable rate-aided competition" referred to in the report, "The Times," in their City Notes on Thursday, said: A pertinent point is raised in the report with regard to municipal competition. The Beckenham Urban District Council is charging upon the rates a deficiency incurred in working its electrical undertaking, and is thus introducing, as regards the Company, rate-aided competition in a most objectionable form. The Beckenham Council has apparently been charging for its electric supply less than it costs to produce; but the proper method of making good the loss would have been to increase its charges. The Directors have quite rightly protested against the action of the Council.

The Demand for Gas-Stoves.—In the August War-Time Markets Reports from correspondents of the "British Trade Review," it is stated that a feature of note is the extraordinary request from cookery centres for gas stoves and fittings—so much so that the supply is not equal to the demand.

TOTTENHAM LIGHT, HEAT, AND POWER COMPANY.

In the report which will be submitted at the forthcoming meeting, the Directors state that the profit for the six months ended June 30, after providing for interest and all other charges, is £18,535. This sum, together with the amount of £682 brought forward from the previous half year, leaves available £19,217. The price of gas was advanced by 8d. per 1000 c ft. at Lady-day, to meet the increased cost of coal and oil. The Directors recommend the payment of the full statutory dividends of 5 p.ct per annum on the preference stock, 5½ p ct. per annum on the "A" stock, and 4 p.ct. per annum on the "B" stock—all less income-tax. This will absorb a sum of £14,751, and leave £4466 to be carried forward.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £190,626; rental of meters, stoves, &c., and the maintenance of incandescent mantles produced £32.390; residuals yielded £44,314; and the total receipts amounted to £267,727. The principal items of expenditure were: Manufacture, £176,800; distribution, £29,362; management, £6627—the total expenses being £236,487. The balance carried to the net revenue account is £31,454 (included in this item is £214, the balance brought from the electricity revenue account); and the total standing at the credit of this account is £32,136. The statements relating to manufacture show that in the half year 1,405,128,000 c.ft. of gas were made, and 1,314,023,000 c.ft. sold; the total quantity accounted-for being 1,336,666,000 c.ft.

NEWPORT (MON.) GAS COMPANY.

Moving the adoption of the report and accounts at the half-yearly meeting of the Company, Mr. George Geen (the Deputy-Chairman) said there had been a remarkable increase in the sale of gas. In fact, the demand during the past six months had been the greatest in the Company's experience. As against 193,800,000 c.ft. sold in the June half of 1916, the present accounts showed sales to the extent of 217,250,000 c.ft., which was an increase of 12 p.ct. The satisfactory feature of this improvement was its universal nature. Not only had munition works and the accompanying canteens taken their share, but factories, business houses, and private houses had all alike contributed to the increased demands upon the gas output. On the other hand, the cost of manufacture had never been so heavy. The Company still had to bear, in common with similar undertakings, the extra advance of 2s. 6d. per ton in the price of coal applicable to the district of South Wales and Monmouthshire, and to no other part of the kingdom. When it was borne in mind that this extra price alone added 2½d. per 1000 c.ft. to the working expenses, the measure of this special burden would be at once apparent. Though the accounts indicated an increased volume of trade, the profits were less by £1800. The balance of £1789 brought forward from the December half year was increased by the present revenue balance of £7041, making available for the debenture interest and the statutory dividend the sum of £8830. The Directors therefore recommended the payment of this interest and statutory dividend. The Company, in common with many others, had responded patriotically to the country's call, submitting loyally to the Government's financial control of prices. In this regard, the testimony of the Right Hon. Lord Moulton, at the annual meeting of the Institution of Gas Engineers, was worth recording. He said it was the gas industry which had supplied the country with the means of defence, and that without it it would have been impossible for the country to have waged the campaigns of the last three years, or even but for a trifling time to have resisted the overwhelming flood of enemies that was poured upon it. They, as shareholders, could only hope that the Government would not lay too much on their shoulders. In conclusion, he paid a high compliment to the work done by the Secretary (Mr. T. H. Hazell), the Engineer (Mr. Thomas Canning), the Manager (Mr. J. H. Canning), and the staff. Great credit was reflected upon all.

The report was adopted; and the Chairman, Directors, and staff were cordially thanked for their services.

THE SLIDING-SCALE AND ITS REVISION.

The following remarks on the need of a revision of the sliding-scale to meet the altered conditions, as compared with those existing at the time it was fixed, appear in the August issue of the "South Metropolitan Gas Company's Co-Partnership Journal."

The National Gas Council will earn the gratitude of all gas shareholders if it succeeds in persuading the Government to do something to rectify the injustices from which companies suffer in consequence of the sliding-scale being based on dead-and-gone market conditions. Our Company's scale was fixed about seventeen years ago, and was arranged so as to give the Company an inducement to effect economies in working. If prices were now what they were then, the shareholders would be getting a very fair reward for the improvements in manufacture and the enterprise in management which have marked the present century. But coal, freightage, wages, taxes, and half-a-dozen other matters more than neutralize the good results of efficient management; and the shareholders and co-partners have to suffer for the benefit of the consumers. Mr. Balfour Browne has called attention in a recent book to the obvious fact that the market price of raw material is likely to be a more uncertain factor than efficiency of working; and, in common fairness, there should be some simple means of adjusting sliding-scales to suit the economic conditions over which the Company have no control. It might be arranged for these scales to be modified from time to time by the Board of Trade, on the application of the Company or of some competent public authority.

Whitworth Vale Gas Company.—There is reported by the Company a profit for the past half year of £338. The disposable balance is £974, out of which the Directors recommend the payment of a dividend of 5 p.ct. on the original and "B" shares, less income tax.

SULPHATE OF AMMONIA PRODUCTION IN 1915-16.

The Barrett Company's (New York) Statistics.

In furnishing particulars of the world's production of sulphate of ammonia for the years 1915-16, the Barrett Company, of New York City, point out that statistics of an accurate character are difficult to obtain. There are none available from Belgium; and the figures for Germany and Austria can only be considered as unofficial estimates, whose dimensions are surprising. As to sources of production, it is pointed out that a new process for the fixation of atmospheric nitrogen, which produces sodium cyanide and (upon further treatment) ammonia, has been put forward by Prof. John E. Bucher. Coke, sodium carbonate, and iron borings are raised to a red heat in an atmosphere of nitrogen or producer gas; and sodium cyanide is formed. By boiling with caustic soda, ammonia is readily obtained. While only in the experimental stage as yet, it is understood that an operating plant is being erected; and a nitrogenous product of some character will be placed on the market before long. Research on these lines has been much stimulated; and numerous other processes for nitrogen fixation have been brought to notice. From a commercial point of view, the years 1915 and 1916 have displayed a practically continuous rise in price, to heights that have not been reached for many years.

Production in the United States.

In the United States, it would appear that the long-expected swing towards the bye-product coke-oven was at last taking place. The production for 1916 is estimated at 325,000 tons—an increase of 75,000 tons over the figures for 1915, or 30 p.ct. Of this production, 272,000 tons are credited to the coke-ovens and 53,000 tons to the gas-works and bone-carbonizing plants. The corresponding figures for 1915 were 197,128 tons for the coke-oven plants and 51,921 tons for the gas-works—a total of 249,049 net tons. To this amount should be added 1000 tons estimated for the recovery of sulphate of ammonia from bone carbonization, &c. So the total figure for the year 1915 would be 250,049 net tons, reckoning all forms as sulphate. The increase of 75,000 tons output in a year is a notable one; but it is scarcely larger than Germany recorded in 1912, when the coke-making industry of that country was being transformed from a non-recovery to a recovery basis.

The total coke production in 1916 was a record breaker, both for beehive and bye-product ovens, amounting to over 54,000,000 tons. This corresponds to about 82,300,000 tons of coal; and taken together with the gas-works carbonization, some 4,700,000 tons, we may place the coal carbonized at 87,000,000 tons for the year. This should have yielded 870,000 tons of sulphate of ammonia, if treated in bye-product ovens, in place of 325,000 tons, the estimated recovery. In other words, only 37 p.ct. of the possible recovery is being effected. If we base the production on coke produced rather than on coal carbonized, we may take the total coke from all sources in 1916 at about 57,270,000 tons, and that from recovery ovens and gas-works at 22,100,000 tons. The bye-product coke is then 38·6 p.ct. of the total.

The consumption of all forms of ammonia, reckoned as sulphate, in the United States was 315,424 tons in 1915 and 347,708 tons in 1916; the increase in home production in 1916 being partly offset by loss in imports. Both consumption figures show substantial increases over the year preceding.

The United Kingdom.

According to the report of the British Alkali Committee, the production of sulphate of ammonia and equivalent in the United Kingdom in 1915 was 426,267 gross tons, practically the same as in 1914. The figures for 1916 are not yet available; but the estimates prepared by Messrs. Bradbury and Hirsch show 438,000 tons for the year—an increase of 12,000 tons.

Apparently the gas-works production fell off about 2200 tons, which was not surprising under the circumstances; but the estimates indicate that 1916 has made up the loss. The other items—namely, iron-works, shale-works, and producer gas and carbonizing works—are about the same, except that the coke-oven output has gained 8000 tons in 1915 and presumably as much or more in 1916. The estimates for 1916 bracket the coke-ovens with the producer gas and carbonizing output, and show an increase of 12,000 tons, probably due to the coke-ovens, although recent installations of recovery producers may have shared to some extent. The consumption for 1915 was 131,000 gross tons, including agriculture, ammonia soda, and munitions uses, which is 25,000 tons more than was used in 1914, but less than the estimate for 1916—178,000 tons. This increase is largely due to the manufacture of explosives in both years; although no exact data are available on this point.

The average price of the 24 p.ct. grade at Hull for 1915 was £14 8s. 1d., and for 1916 £17 7s. 8d. per ton. The first is £3 1s. more than for 1914, and the second is an increase of £2 19s. 7d. over 1915. Both are the highest prices since 1884. Indeed, the 1916 average has not been equalled since 1882. At the same time, nitrate of soda has been selling at approximately the same price per ton, and at times even higher

Production in Germany.

There are no figures of an official nature available for the ammonia production of Germany since those for 1913. What data we have, however, as well as the logic of circumstances, lead us to the belief that the 1913 production figure of 548,560 tons has been largely exceeded under stress of war conditions. An article printed in May, 1916, in the "Frankfurter Handelsblatt," makes some statements that are of interest in this connection.

The following particulars give an idea of the extraordinary rapidity with which the Haber process has developed. The capacity rose from 30,000 tons in 1913 to 60,000 tons in 1914; and about the middle of 1915 the output of the original works was about 150,000 tons. For 1916, the production is reckoned at 300,000 tons. It is no secret that the Badische Company have lately put up further large plants in another part of Germany; so that its producing capacity for 1917 will no doubt be considerably in excess of 1916. Assuming that the Haber production in the near future will reach 500,000 tons, this process alone will represent the production of an amount of nitrogen

World's Sulphate of Ammonia Production.

(In metric tons of 2204·6 lbs.)

Country.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
England	294,170	318,400	330,450	354,747	373,590	391,160	394,540	439,565	433,259	433,011	445,033
Germany	235,000	287,000	313,000	330,000	373,000	418,000	492,000	548,558	..	..	..
United States	68,000	90,120	79,500	96,600	105,143	115,245	149,700	176,900	166,016	226,834	294,838
†France	49,100	52,700	52,600	53,600	56,000	60,000	68,500	74,500	..	42,000	25,000
†Belgium and Holland	30,000	*55,000	§35,000	§40,000	§43,000	§43,000	§55,800	§53,600	5,000	5,000	4,000
†Spain	10,000	‡12,000	..	12,000	9,000		§9,000	§15,000	15,000	15,000	16,000
†Italy	5,000	11,000	§80,000	12,000	12,000	§166,500	§15,000	§15,000	14,323	15,000	..
†Other Countries	40,000	65,000	..	§73,000	§79,000		¶68,800	¶86,100	..	..	..
Total	731,270	891,200	890,550	971,947	1,050,733	1,193,905	1,253,340	1,409,223			

* Including Norway, Sweden, and Denmark. † Estimates from l'Engrais. ‡ Including Portugal.
§ Estimates from Deutsche Ammoniak-Verkaufs-Vereiningung, 1908-9-10-11-12-13. ¶ Estimated.

nearly equal to the amount of nitrate of soda we used to import. In passing, it may be mentioned that such a production at a price of $60 per ton would represent an annual turnover of $30,000,000 for this one firm.

In addition, further large quantities of nitrogen have been produced with state aid in the form of cyanamide, with the aid of which German agricultural needs can easily be met. Furthermore, the whole tendency in the coal industry has been towards the increase of bye-product ovens. Up to the time when the war broke out, about one-fifth of our coal was coked; but the war has forced resort to coking to a far greater extent than before. Everything points to the conclusion that in the near future the direct combustion of coal will be recognized as altogether uneconomic and disappear, and its place be taken by bye-product processes. This, of course, means increased recovery of ammonia from coal. Assuming that only double the quantity of coal hitherto used is employed for the recovery of ammonia, the increase in sulphate of ammonia production amounts to 450,000 tons. Based on the above, the following comparison between 1913 and 1917 can be made:

German Consumption of Nitrogen, 1913, in Metric Tons.

Sulphate of ammonia	460,000 tons	—	92,000 tons nitrogen
Norwegian nitrate of lime	35,000 ,,	—	4,500 ,, ,,
Cyanamide	30,000 ,,	—	6,000 ,, ,,
Ammonia—Haber process	20,000 ,,	—	4,000 ,, ,,
Total			106,500 ,, ,,
Plus nitrate of soda	750,000 ,,	—	116,000 ,, ,,
Grand total			222,500

German Production of Nitrogen, 1917, in Metric Tons.

Sulphate of ammonia	700,000 tons	—	140,000 tons nitrogen
Norwegian nitrate of lime	.. ,,	—	.. ,, ,,
Cyanamide	400,000 ,,	—	80,000 ,, ,,
Ammonia—Haber process	500,000 ,,	—	100,000 ,, ,,
Total			320,000 ,, ,,
Nitrate of soda			None

If these statements are only approximately correct, our own production will already next year be greater than our consumption before the war, including the amount of nitrate of soda imported. In case of need, therefore, we can altogether do without the importation of nitrate of soda for agricultural purposes. This does not mean, however, that the import of nitrate of soda is either unnecessary or undesirable. Nitrate will remain very much wanted for certain purposes; and agriculture will be glad to make use of it as long as prices remain competitive—especially in view of the amount of German capital invested in the Chile nitrate industry.

How close the actual figures for 1917 will come to these estimates, and how much of the enormous capacity claimed will be effective when the war is over, it is of course impossible to say. The statements regarding the increase in bye-product coking and in the use of coke are interesting, especially as there is reason to think that the coke-plants can be operated economically in times of peace.

The proposed nitrogen monopoly, by which the production of Germany was to be protected for a seven-year period to offset the cost of war construction and operation, appears to have been definitely abandoned. Some of the new plants, it is stated, have however received considerable financial assistance from the Government.

FRANCE.

The production of sulphate of ammonia in France has fallen off in 1916 to 25,000 tons, only one-third of the 1913 output. The figures for the last two years are given on the authority of the Comptoir Français du Sulfate d'Ammoniaque. Details as to source are not available; nor is there any estimate for 1914.

JAPAN.

The imports into Japan from England have been very low compared with previous totals—amounting to 10,537 tons in 1915 and 9155 tons in 1916. The total imports into Japan and the amounts received from Great Britain, according to the official Japanese commercial statistics, are as follows:

	1913.	1914.	1915.
Imports from Great Britain	108,243 ..	103,760 ..	17,806
Total imports	110,635 ..	104,794 ..	19,195

So far as these figures go, it would appear that Japan imports practically her whole supply from Great Britain. The 1916 data are not yet available.

RUSSIA.

Russia has been making forward strides in sulphate of ammonia production; the principal source being the bye-product coke ovens in South Russia. The figures, which have hitherto been included in the table of world's production with those of other countries, are as follows; 1911, 524 tons; 1912, 4013 tons; 1913, 13,089 tons; 1914, 17,167 tons; 1915, 16,380 tons.

In the year 1916 it was reported that the production would amount to 32,760 tons, because of the increase in coke-oven capacity, largely in the vicinity of Kharkoff. It is also stated that the stocks on hand at the plants at the close of 1915 were considerable, amounting to 24,570 tons, which would make the estimated supply for 1916 amount to 57,332 net tons. The home consumption of sulphate of ammonia is small, Chilean nitrate having been used for fertilizer purposes until the outbreak of the war. Since then it has been used more freely.

CHINA.

According to the Chinese Year Book for 1916, the output of sulphate of ammonia in 1915 was about 4000 tons; and an increase to 10,000 tons in 1916 seemed probable. The product was said to be marketed in Japan.

AUSTRALIA.

The production of sulphate of ammonia in Australia is given by the Ammonia Company of Australia, as follows: 1913, 5487 tons; 1914, 5741 tons; 1915, 6503 tons; 1916, 7214 tons.

OTHER COUNTRIES.

The production of Holland, hitherto combined with that of Belgium in the table of world's production, is given as 7000 tons in 1913, 5000 tons in 1914, 5000 tons in 1915, and 4000 tons in 1916. The imports were 47,647 tons in 1914, and 33,900 tons in 1915; while the exports, which were 31,183 tons in 1914, dropped to 76 tons in 1915.

Sweden produced 1377 tons in 1913, 1510 tons in 1914, 1200 tons in 1915, and 1000 tons in 1916.

COAL PRICES AND COST OF GAS IN AMSTERDAM.

[From a Dutch Correspondent.]

One of the means adopted for securing economy in the use of gas in Holland has been a system of imposing additional charges for all quantities of gas consumed above certain limits. The Amsterdam Municipal Council have, however, in spite of opposition, decided to abolish the additional charges, and instead to raise the price of gas in proportion to the enhanced cost of manufacture. Until now, the normal figure has been at the rate of 3s. 4d. per 1000 c.ft., and 3s. 7d. for prepayment consumers. But the considerable rise in coal prices, and therefore in the cost of manufacturing gas, rendered these charges unprofitable, with the consequence that it was proposed (and agreed) that the Municipal Council should raise the price of gas to 4s. 9d. and 5s. per 1000 c.ft. respectively.

A report dealing with the matter gives some information with regard to the cost of gas production. In the first quarter of 1917 the loss amounted to £2708; and that this figure was not higher was due chiefly to the additional charges for quantities consumed above the limits fixed. These extra charges amounted to £21,510; so that, reckoning the whole of the consumption at 3s. 4d. per 1000 c.ft., the total loss would have been £24,218. As a matter of fact, the cost price of the gas during the first quarter was 4s. per 1000 c.ft.; the average price of coal being 36s. 3d. per metric ton—calculated on the remaining stock of coal from the previous year, and the supplies received during the three months. For the second quarter of this year, the price of coal equalled 41s. 8d. per ton, which increased the manufacturing cost of gas to 4s. 4d. per 1000 c.ft. With the old gas rates, this gives a loss in the working results of £9666 for the quarter alone. Inasmuch as in the third and fourth quarters coal prices must be reckoned at 43s. 4d. per ton, the cost price of the gas is likely to rise to 4s. 7d. per 1000 c.ft. Therefore, if the old gas price were maintained, a loss of £50,800 might be expected. With, however, at the beginning of July, the price increased to 4s. 9d., the average revenue will amount to 4s. 10d. per 1000 c.ft., in which case a net profit may be looked for of £15,866 for the second half year. Deducting the loss incurred during the first half year, the net results for 1917 would thus be a profit of £3492.

In the above estimates for the second half year, a gas oil price of £12 10s. per metric ton was included; but in the meantime the price has increased to £23 6s. 8d. per ton for a supply of 1100 tons. This addition to the cost of carburetting will render the net profit referred to altogether illusory, and convert it into a loss of £8425.

A Large Dye Combination in America.—The National Aniline and Chemical Company has lately been inaugurated at New Albany (N.Y.), with a capital comprising 200,000 7 p.ct. preference shares of £20, and 350,000 ordinary shares carrying no fixed face value. It is an amalgamation of several concerns; and as the whole of the capital has been taken by the constituent undertakings, in exchange for their properties, a public issue of shares is not contemplated. The avowed object is to supply all American requirements, by the manufacture of coal-tar dyes and intermediates that will successfully compete, both in regard to quality and variety, with those hitherto imported, and the permanent elimination of Germany as the chief source of colours in the home market. Important extensions of plant are in view.

A LOWER HEAT STANDARD ASKED FOR NEW JERSEY, U.S.A.

It is reported by the "American Gas Engineering Journal" that the Public Service Gas Company, of New Jersey, and a number of smaller gas concerns petitioned the State Public Utilities Commission for a readjustment of the gas standard which has been in force in New Jersey since Oct. 17, 1911. The Public Service asked that, if the standard is not lowered, it be allowed to increase its rates. The Board held a public hearing on the applications on the 19th ult.

The Public Service in its petition did not suggest any new standard to take the place of the one now existing. It stated that, since the standard was fixed in 1911, the conditions surrounding the manufacture of gas have materially changed; and it is now almost impossible to maintain the standard and manufacture gas profitably. The smaller companies which petitioned recited that during the last two years the costs of coal, coke, and oil—the main elements in gas-making—together with the cost of labour, had increased to such an extent that a condition exists whereby the gas companies must have speedy relief if they are to be saved from heavy and unmerited loss.

New Jersey requires every gas company to maintain a gas standard based on a monthly average total heating value of not less than 600 B.Th.U., with a minimum which shall never fall below 550 B.Th.U. This is materially higher than similar standards used in adjoining States; but it was fixed after exhaustive tests and experiments. The petitioners claimed that adequate service would be given if the standard was made to conform with those of other States, and at the same time the companies would be given a margin for profit because of the saving that would result in the cost of manufacture.

COAL CONCRETED FROM DUST OR ASHES.

A paper was read before the Society of Architects some weeks ago [see "Journal" for June 12, p. 530] by Mr. R. Goulburn Lovell, in which he described a process for utilizing waste material of calorific value. During the meeting it was suggested that the process of manufacture should be demonstrated, and that the analysis of the component parts and the resultant fuel should be shown. Last month, in a second paper, Mr. Lovell complied with this suggestion—remarking that his colleague, Mr. C. M. Hughes, and he were anxious to explain all that they could. They did not claim that their process increased the total thermal value of the aggregates; but they did say that there are many so-called waste materials which may be converted by this simple process into a fuel valuable for many purposes. By it, a British thermal unit costs less than that obtained by means of Nature's coal. This is the point that must appeal most strongly to the commercial mind.

There are three methods of making the fuel, which may be called A, B, and C. A and B may be termed dry processes. In this case, there are taken as aggregates ashes and coal dust. The cinder-sifter first of all plays its part by sifting the fine dust, which is of little or no value. The coarse aggregate is therefore composed of all between ¼ and ⅛ mesh. This is dried, and then sprinkled with a special sugar-waste solution, and again dried. The fine aggregate is taken from the coal-cellar dust—only that which passes ¼-in. mesh being used. These two bases should be intimately mixed with the matrix or binder. Up to this point, A process and B process are exactly the same. Process A is employed wherever the sun has much value, or where heating-chambers are available. The mixed aggregates and binder have in some cases a small quantity of creosote oil added. They are placed in moulds, and allowed to concrete; the time, of course, varying with the amount of heat available. The fuel, when cold, is emptied out of the moulds, broken up, and hardened by exposure to the atmosphere. With process B, the small quantity of creosote oil (if used) is placed in a boiler, the mixture of bases and matrix is added, and the whole is placed upon a fire and stirred until a temperature of about 120° Fahr. is obtained, when the material is emptied into a mould. In a short time it is cold, and is emptied out, broken up, and allowed to harden. Process C is a wet process, in which there is no need to dry the aggregates. They are mixed as before, but with a different matrix mixture. The creosote oil, if used, is added and well mixed. The whole is then moistened with the solution until a consistency of mortar or concrete is obtained. It is then emptied into shallow moulds, or between sheathing boards, and dried by exposure, but protected from the wet.

In all three processes the character of the matrices varies with the character of the aggregates; and the different aggregates have to be treated by different methods. This method of concreting fuel dispenses with any kind of pressure beyond a slight tamping into the moulds. Capable men are required to control the manufacture, in order to standardize, as far as possible, the qualities of the various fuels. Process A is more particularly suited to climates favoured with a succession of sunshine, or it is equally well suited to any industrial concerns having ovens or heating-chambers where the moulds and their contents could remain for twenty minutes or half-an-hour. For low-grade cokes, coals, or bar ashes, process A is the best method. Process B is suited for any form of rotary asphalt plant, either fixed or movable. Portable heaters could be taken to any dumps of coal slack, coke dust, or cinders, and very quickly transform them into a good fuel. For all materials high in carbon but low in volatile matter, process B is the best method. Process C is the cottager's method of producing coal in his own back yard. For high-grade cokes, high-grade bituminous coals, or a mixture of the latter with ashes, peat, sawdust, &c, process C is the best method. The town refuse yard, the gas-works, the brick and tile works, and other places have thousands of tons of potential coal scattered up and down the land. The individual and the firm can help the country and themselves by tackling this question now.

[The author submitted a tabulated statement of analyses of seven different types of fuel, ranging from peat to anthracite, made under the three processes, together with the calorific values of their component parts.]

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Aug.* 3.

As usual, the products markets are quiet at this time of the year. Pitch remains firm at about 45s. net per ton f.o.b. makers' works, and quantities are being shipped as tonnage is available. Creosote is nominally 4¼d. to 4½d. net per gallon, but may only be sold under licence of the Ministry of Munitions. There is nothing to report as to other tar products.

Sulphate of ammonia is being sold mostly for forward delivery, on the basis of the official prices, for home agriculture.

Tar Products in the Provinces.

Aug. 4.

There is nothing of importance to report with regard to prices for tar products, with the exception of solvent naphtha, which appears to be a little firmer.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. 3d. to 24s. 9d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s. 6d., Liverpool 16s. 6d. to 17s. 6d., Clyde 17s. to 18s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

COAL TRADE REPORT.

Northern Coal Trade.

The holidays have, as usual, been preceded by a fuller demand for coal. In the steam coal trade, an order for the Norwegian Railways has been booked at just about the settled prices. Best steams are near 30s. per ton f.o.b.; second-class qualities are 25s. 6d.; and steam smalls are plentiful, varying from 18s. 6d. to 20s. 6d. In the gas coal trade, the demand is fuller; but the want of steamers is felt. Best Durhams are about 25s. per ton f.o.b.; second-class descriptions are easy at 24s.; but "Wear specials" are firm at 29s. to 30s. While these are the current quotations, where a steamer can be offered for prompt loading, some discount may at times be obtained from them. It is believed that the stocks of gas coal have been increased of late. Freight is from 15s. to 16s. Tyne to London, where contracts have not been arranged. The coke trade is steady, with prices at from 29s. 6d. to 31s. 6d. f.o.b. for good gas coke. Freight on coke to Dunkirk is 45s.

Stockport Labour Troubles.

Attention was drawn by Mr. J. Winter (the Chairman of the Gas Committee), at last week's meeting of the Stockport Town Council, to the unsatisfactory attitude adopted by some of the men at the works in throwing up their jobs without notice, after the Arbitrator had given his award on the question of wages. At whatever decision the Arbitrator arrived, the men ought, he said, to have adhered to it. Their Secretary came from London and spoke to the men, and told them what the award was. They agreed with him, and actually passed a vote of thanks to him; and the next minute, when they received their wages, they put down their tools and refused to go on working. The undertaking could not be carried on if such action was repeated. The Committee did not mind the loss of a day so far as the Corporation were concerned; but at a time like this, when so many munitions works and hospitals depended for heat and lighting, and the comforts of wounded soldiers, upon a continuance of the supply of gas, such a proceeding was most unwarrantable. The recent award would make a difference of £5000 a year in bonus alone. The additional wages would swell the amount to £10,000; and the 6d. increase in the price of gas realized only about £14,000. At a time like this, the men should be more loyal to the department. The Committee had made up their minds that they were not going to tolerate such conduct much longer. The gas-works were now a certified controlled department; and if any similar action was taken by the men in future, the Ministry of Munitions had power to step in under the Defence of the Realm Act.

It has been agreed by the Burnley Town Council that there is to be no lighting of streets until Sept. 1; and instructions have been given for the necessary arrangements to be made for a resumption of street lighting for the winter.

The Lancaster Gas Committee have made arrangements to supply gas to several motor char-a-banc owners. The charge is to be 3d. per 100 c.ft. or part of 100 c.ft., with any labour costs in addition. A Sub-Committee of the Bolton Corporation are considering the question of coal gas being utilized for motor-driven vehicles, and have full authority to take such action as they deem advisable.

Why a manufacturer should establish works at Burton-on-Trent is explained in an official illustrated handbook issued by the Commercial Development Committee of the Corporation. One of the reasons given is because gas and electricity may be had on exceptionally low terms for power. A photograph of the show-rooms is included; and it is pointed out that types of the best and most modern domestic labour-saving appliances may be seen in operation there, and practical advice obtained on all questions of gas lighting, heating, and power. On a book-mark, features connected with the gas supply are indicated, and the scale of charges for gas is set out.

A Commission for a Gas Stoker.—A Bradford Corporation gas stoker, Sergeant E. Sutor, has signally distinguished himself in the army. He has done such good service at the front that, following his promotion to be Sergeant, he was sent to an officers' training battalion at Bristol, and has now been given his Commission. Second-Lieutenant Sutor has the heartiest congratulations of his fellow workers in the Bradford Gas Department.

Bo'ness Gas Light Company, Ltd.—The annual meeting of the Company was held last week, when it was reported that the profit for the year, after allowing for depreciation, amounted to £856. Including the amount brought forward, there was for disposal the sum of £1669, from which a dividend of 6 p.ct., free of tax, was declared, leaving £821 to carry forward. The Manager (Mr. James Campbell) stated that the gas made amounted to 35,857,000 c.ft., a decrease of 3·25 p.ct. It was intimated that the price of gas would remain as before, at 3s. 4d. per 1000 c.ft.

Breathing Apparatus Used in Coal Mines.—The Committee of the Privy Council for Scientific and Industrial Research, on the recommendation of their Advisory Council, and at the request of the Home Office, have sanctioned the appointment of a Committee to inquire into the types of breathing apparatus used in coal mines, and by experiment to determine the advantages, limitations, and defects of the several types of apparatus, what improvements in them are possible, whether it is advisable that the types used in mines should be standardized, and to collect evidence bearing on these points. The following have been appointed members of the Committee: Mr. William Walker, Acting Chief Inspector of Mines under the Home Office (Chairman); Mr. John Haldane, LL.D., F.R.S.; and Mr. H. Briggs, D.Sc., of the Heriot-Watt College, Edinburgh. Mr. A. Richardson has been appointed Secretary; and Dr. Henry Briggs is constituted Director of the Inquiry.

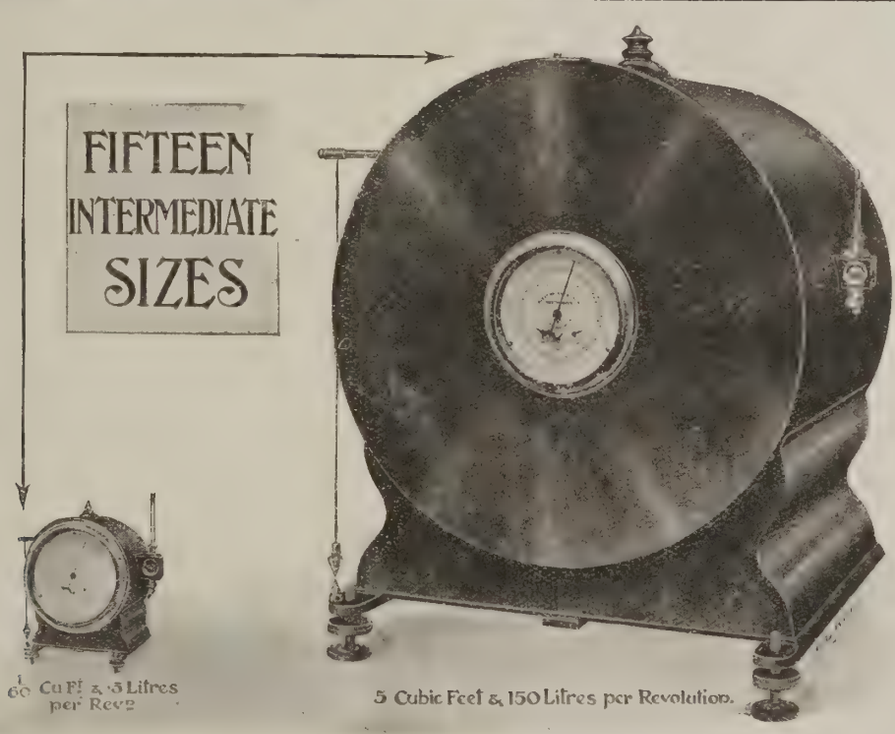
Coal Gas for Vehicles.—According to the "Commercial Motor," there are now 350 flexible gasholders fitted to commercial motors for use on the highways of the United Kingdom; and the displacement of petrol is already at the rate of 700,000 gallons per annum. "The claims of coal gas for propulsion on common roads," it is added, "have attracted much additional support during the past three months, by reason of the satisfactory experience of earlier users. If one takes the cost of coal gas so high as 4s. per 1000 c.ft., and puts the average consumption of a 3-ton lorry at 2000 gallons of petrol per annum, the use of the alternative fuel effects an economy of more than £100 in a year. If the gas can be bought so low as 2s. per 1000 c.ft., the saving will exceed £150 in a year per three-tonner. If a user is concerned with motor-bus operation, in which the daily mileages are higher than in average goods service, the economy may run to so much as £1 per vehicle per day, or even be greater than that." Blackpool and Brighton gas-driven motor omnibuses were illustrated in last Thursday's "Daily Graphic."

Leeds Wages Arbitration.—Mr. Forbes Lankester, K.C., sat at the Leeds Town Hall last Tuesday, as Arbitrator in a dispute between the Corporation and the General Workers' Union on the wages of the Gas and Electricity Department employees. The men's application was for an increase of 3s. per week on the existing advances on pre-war rates of pay, making a 10s. increase, instead of 7s. Mr. Wood, on the men's behalf, contended that the application was reasonable, when they remembered that the men worked along with members of the Amalgamated Society of Engineers, who, by a recent award, had an increase of 15s. per week on pre-war wages. Alderman C. H. Wilson, for the Corporation, urged that the ratepayers were hard pressed by war conditions, and that the claim was uncalled-for, so soon after the award to the tramway men. The men who were not tramway men, and who had received an advance of 2s. only three months ago, should be satisfied. The Arbitrator received a deputation from the workmen, and reserved his decision.

Stockport Gas-Works Deficiency.—Presenting to the Town Council the report on the past year's working of the Stockport Corporation gas undertaking, the Chairman of the Gas Committee (Mr. J. Winter) said he regretted he was not able to repeat the satisfactory statement of last year, when there was a profit of £13,958, because there had been a loss of £4432, making a difference of £18,014 in the working of the undertaking. There had been an increase in the income from residuals of £9485, of which £3572 had been contributed in the months of February and March. But against any increased income had to be set a decreased income from sales of gas. The Committee were doing all they possibly could to assist the Government in getting out as much high explosive as possible. It was unfortunate that, from an undertaking involving such a large capital expenditure, they had not been able to secure for last year a reasonable return; but, as the Council knew, the Committee had been handicapped. He hoped next year, by means of the new plant put down, to present a more satisfactory statement.

Price of Coke at Halifax.—Members of the Halifax Town Council have been discussing the price of coke, on a recommendation of the Gas Committee that after Oct. 1 the charge be increased to 25s. per ton. One member, in moving as an amendment that the price be 15s. per ton to residents in the borough, said the Commtttee's proposal would mean taking advantage of the poorest people in very hard times. Mr. J. H. Waddington (Chairman of the Gas Committee) pointed out that pennyworths of coke, weighing 14 lbs., which was only at the rate of 14s. 6d. per ton, were supplied at the gas-works to all who came for them and took them away. To-day there were only 120 tons of coke at the gas-works, compared with 2000 tons a year ago. The amendment was defeated. An amendment that no person purchasing 1 cwt. of coke should be charged more than 9d. per cwt. was also lost. Mr. Waddington remarked that the expenses at the gas-works were £34,000 a year more than they were three years ago. The increase in the price of gas brought only £9000 a year more; and the rest had to be made out of residuals.

Laboratory Meters - - -



Alexander Wright & Co., Ltd.,

WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Gas Price in Cavan.—The Cavan Gas Company announce that, owing to the increased cost of coal, freights, labour, &c., they are compelled to increase their price from 6s. 8d. to 7s. 1d. per 1000 c.ft.

An Appeal to the Public.—In view of the paramount importance of meeting the increasing need for bye-products obtained from the carbonization of coal at gas-works, the Minister of Munitions has, through the public Press, impressed on those who possess gas-burning appliances the desirability of using gas in preference to any other means of obtaining light, heat, or power. At present, he says, an increased supply of gas may be provided without difficulty, inasmuch as during the summer months gas undertakings generally are in a position to manufacture in excess of the ordinary requirements of consumers.

Okehampton Gas Company.—At the annual meeting of the Company, the Chairman (Mr. Seth Harry), in moving the adoption of the report, said he was very sorry the Directors had not been able to present a more favourable balance-sheet. The smallness of the net profit of the past year's trading was due to the price of coal and of everything in connection with the manufacture of gas. They had also suffered loss on account of delay in the delivery of coal by the railway company. The consumption of gas, as compared with previous years, had been somewhat less, though the coal cost more. It was decided not to declare a dividend, but to carry forward the amount available.

Burnley and the Supply of Gas Oil.—It was reported to last Wednesday's meeting of the Burnley Town Council that the Gas Engineer (Mr. J. P. Leather) had read to the Gas Committee a letter from the Anglo-American Oil Company, stating that, by order of the Petroleum Pool Board, the supply of gas oil to gas undertakings had to be discontinued, unless a certificate of the Ministry of Munitions is held permitting a supply. The Engineer also reported that, as a result of this, it would be necessary to obtain larger coal supplies. The Chairman and Vice-Chairman of the Gas Committee and the Engineer were authorized to make arrangements to secure an adequate supply of coal, and if possible of gas oil, for their requirements.

Coatbridge Gas Company.—The report to be submitted to the annual meeting of the Company states that the accounts for the year ended June 30 are satisfactory. The consumption of gas amounted to 289,328,194 c.ft., being an increase of 44,441,507 c.ft. over the corresponding period—solely due to demands for munition purposes. The gas unaccounted-for was 7·86 p.ct. The gross revenue from gas, residual products, &c., amounted to £53,419. The Directors will recommend the payment of dividends, in accordance with the sliding-scale, at the rate of 11½ p.ct. on the original stock, and £8 1s. p.ct. per annum on the three issues of £10 shares, less income-tax. It is understood that the price of gas will remain as at present—2s. per 1000 c.ft., which, along with Uddingston, is still the cheapest gas in Scotland.

STOCK MARKET REPORT.

The prevailing characteristics of markets on the Stock Exchange last week were quite favourable. The tone was always, except perhaps just at the start, as good as firm and sometimes amounting to cheerful; and this became the more pronounced up to the close. In ordinary circumstances, one might have witnessed a marked recovery in prices; but, faced as they were with a holiday closure from Friday till to-day, they scarcely had scope to develop. The great stimulating factor was the joyous news of Haig's fine achievement on Tuesday, which came abundantly welcome after a long dearth of information. The intelligence also of Russian regiments coming to their senses and their duty under Korniloff's masterful hand assisted. Thus buttressed, markets were firm.

The gilt-edged division, after a little hesitation on the opening day, got a fair way and sailed away cheerily. Home Governments were very firm, and several of them advanced. Home Rails made a nice recovery and enjoyed a demand long denied to them. In the American Market, the chief feature was the strength of Canadian lines on the Dominion Government's decision in regard to taking over. Argentines advanced, but gave ground a little before the close. South African were steady.

The Foreign Market showed strong points; but here, too, movements became irregular. Russian were better on the whole, and French and Scandinavian were firm. There were inquiries for Dutch and Greek issues. Brazilian and Japanese were uncertain. Among the rest, Textiles and Breweries were the firmest.

Business in the Gas Market was not on the increase—in fact, had it not been for a fair array of transactions in the biggest issue, the aggregate would have been meagre indeed. Prices, on the whole, were inclined to easier figures, though there was no pronounced fall. South Metropolitan announce a full statutory dividend at the rate of £4 13s. 4d. p.ct., and South Suburban a similar dividend at the rate of £4 16s. 8d. p.ct.

In the Money Market, there was hardly any change in rates.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 68¼, ditto debenture 55⅜, Imperial Continental 79⅛, 80, San Paulo debenture 40⅝, South Suburban 78. On Tuesday, Brentford "A" 80½, European 11, 11 1/16, Gas Light ordinary, 67⅛, 67¾, 68, 68½, ditto debenture 56⅝, Imperial Continental 79, 79½, 80, Monte Video 8 1/16, Primitiva 36s., ditto preference 55s. On Wednesday, European 11⅜, Gas Light ordinary 67, 67⅛, 67⅜, 67¾, 68, 68¼, ditto debenture 55⅛, 55¼, Imperial Continental 80, South Suburban 77, 77½. On Thursday, Gas Light ordinary 67⅛, 67⅜, 67⅞, 68, 68¼, ditto maximum 55, 55½, Imperial Continental, 79⅛, Monte Video 8⅛, Primitiva 36s. 6d., 37s., ditto preference 56s. 3d., Newcastle debenture 62. On Friday, Bournemouth "A" 25⅞, European 11½, Gas Light ordinary 67⅛, 68, 68¼, 68½, ditto maximum 55⅜, 55½, 56, Imperial Continental 80½, South Suburban 77, Tottenham "A" 96½.

The Bank rate is 5 p.ct., as fixed on April 5.

In view of the increase in the cost of lighting, the London County Council last Tuesday approved of an additional expenditure of £75 for seven Thames Bridges, £33 for Woolwich Ferry, and £25 for the Thames Embankments.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref. .	..	58—63	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5¼	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	29—30	24—26	25⅞
383,110	10	,,	7	7/-		15—15½	10⅜—11½	..
115,000	10	,,	6	6/-		13½—14	9¼—9⅝	..
159,740	—	—	—	4%		..	66—71	..
992,045	Stk.	Feb. 26	14	5 1/14%	Brentford A Consolid. .	261—266	79—82	80½
734,920	,,	,,	11	4 7/11%	Do. B New . .	204—209	77—80	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb. .	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig. .	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk..	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1⅜—2⅜	2⅜—3	..
100,000	10	—	—	4¼%	Do. 4⅓ p.c. Pref. . .	4—6	6⅞—7⅛	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk. .	106—108	72—74	..
560,000	,,	,,	5¼	46/8	Do. 3½ p.c. do. .	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69¼—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	60—62	..
278,400	,,	—	—	11½%	Croydon B and C 7 p.c..	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk. . . .	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd. . . .	17½—18	11—12*	11—11⅜
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord. . . 3½ p.c. max. . . 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds .	98—102	67—69*	67—68½
2,600,000	,,	,,	3½	3½%		76—79	54—56*	55—56
4,062,235	,,	,,	4	4%		96—99	70—72*	..
4,674,850	,,	June 11	3	3%		72⅜—74½	55—57	55⅛—56⅝
130,000	,,	,,	10	10%		..	..	..
258,740	,,	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16¼—16½	7½—8½	..
86,600	—	—	—	9⅛%	Hornsey 7 p.c.. . . .	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅛%	Ilford A and C. . . .	151—154	95—100	..
65,780	,,	,,	6⅜	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb. . . .	92—94	65—68	..
4,940,000	,,	May 14	9	4⅛%	Imperial Continental .	150—160	79—84	79—80½
1,235,000	,,	Feb. 12	3⅛	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6⅛%	Lea Bridge Ord. 5 p.c. .	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A B	211—213 146—148	82—83	..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3¾—4*	..
250,000	100	April 1	4½	4⅛%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11½—12	8—8½	8 1/16—8⅛
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅜—99½	68⅜—69½*	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—88	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c. .	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B . .	128—131	92—97	..
100,000	50	,,	12	11%	Do. C . .	118—121	85—90	..
52,000	50	,,	10	9%	Do. D . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅛—6	1⅞—2⅛	36/—37/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref. .	4⅝—5	2⅜—3¼	55/—56/3
521,600	100	June 2	4	4%	Do. 4 p.c. Deb. .	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb. .	85—87	59—61	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.. 5 p.c. Deb. .	10½—11	7⅜—8¼	..
125,000	50	July 1	5	5%		47—49	40—42	40⅝
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African. . . .	10½—11½	8¼—9½	..
6,609,695	Stk.	Feb. 10	5/1/0	46/8	South Met. 4 p.c. Ord. .	111—113	73—75	..
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb. .	72⅛—74½	55—57	..
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	77—78
60,000	,,	,,	5	5%	Do. 5 p.c. Pref. . .	110—112	77—79	..
135,000	—	—	—	48/4	Do. West Kent . . .	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord. . .	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham District { A 5 p.c. . B 3½ p.c. . 4 p.c. Deb.	135—138	95—100	96½
782,275	,,	,,	6	3½%		115—117	68—73	..
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c..	151—156	114—119	..
255,636	,,	,,	6⅛	65/-	Do. B 3½ p.c. .	129—134	99—101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c. .	110—115	86—91	..
352,000	,,	,,	6⅛	58/9	Wimbledon 5 p.c. . .	117—122	88—93	..
98,000	,,	,,	6⅝	65/-	Epsom 5 p.c. . . .	121—126	96—101	..
88,416	..	June 26	3	3%	3 p.c. Deb. Stk. . .	66—69	50—53	..

* Ex. Div.

Maidstone Gas Company.

At the annual meeting of the Company on Thursday, the Directors, in presenting the accounts for the year ended June 30, will report that, although the price of coal at the pit-head is governed by the Price of Coal Limitation Act, no attempt has been made to regulate freights. During the past trading year, these have shown a persistent advance; and the present position can only be described as acute. While the income from residuals continues satisfactory, it is impossible to meet the extra cost of coal from this source alone. In face of these facts, the Directors had no option but to increase the price of gas by 6d. per 1000 c.ft.—the increase to take effect after the readings of the meters for the June quarter. Sales of gas show an increase of 7 million c.ft., or 2·24 p.ct., over the preceding year. The accounts indicate that, after providing for all fixed charges (including £2000 depreciation in respect of stoves and fittings), and £800 to the renewal fund, there remains an available balance of £13,819; and the Directors recommend payment of a dividend at the rate of £5 3s. 6d. p.ct. less tax, for the half year to June 30; an interim dividend at the same rate having been paid in March. In November last, the Directors converted the reserve fund investment of £5660 in 2½ p.ct. Consols, at a cost of £79, into the same amount of 2½ p.ct. Metropolitan Consolidated Stock. This stock is redeemable at par any time after 1919, and not later than 1949, and under normal conditions should show a marked appreciation in value long before the latter date. Fifty-two of the Company's employees have joined the army or navy since the commencement of the war. Of these, the Directors regret that three have been killed and two are prisoners of war.

The Doncaster Town Council, in committee last week, after hearing a report by the Chairman of the Gas Committee as to the present position of the coal contracts and supplies, recommended that the Committee be authorized to purchase immediately a second-hand water-gas plant, now at Truro, at an estimated cost, inclusive of removal and re-erection, of £650.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 1.]

Nos. 10,526—10,897.

Bartlett, H. A.—"Gas-producers, &c." No. 10,544.
Bennett, S. J.—"Electrical appliance for igniting combustible gases." No. 10,664.
Campbell, A.—"Gas-burners." No. 10,872.
Crossley, Sir K. I.—"Horizontal gas-engines." No. 10,662.
Crossley, Sir K. I.—"Vertical gas-engines." No. 10,663.
Dutt, P. K.—"Purification of commercial benzol, &c., from thiophene, &c." No. 10,786.
Eaves, E.—"Gasholders for compressed gases." No. 10,713.
Espenhahn, E. V.—Treatment of gases obtained from coal, &c." No. 10,703.
Hamer, J. D.—See Dutt. No. 10,786.
Heenan & Froude.—"Treating and cooling air and gas." No. 10,860.
Holophane Glass Company and Holophane, Ltd.—"Glassware for illuminating." Nos. 10,709, 10,710, 10,765, 10,766, 10,767, July 25 and 26.
Massey, T. H.—"Rotary compressors or pumps." No. 10,657.
Pearson, A. G.—Water-heating and cooking apparatus for gas-stoves, &c." No. 10,849.
Seal, S.—Gas-meters." No. 10,603.
Shawcross, G. B.—See Eaves. No. 10,713.
Telephos Domestic and Street Lighting Company.—"Operating electric switches from a distance." No. 10,817.
Theisen, H. E.—Drying, purification, and cooling of gases, vapours, &c." No. 10,611.
Tipper, G. E.—See Seal. No. 10,603.
Webb, W. Le. P.—See Crossley. Nos. 10,662 and 10,663.
Wilson, W.—"Coke-discharger." No. 10,730.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Gas Manager. Whitehaven Gas Company. Applications by Aug. 25.
Chemist. Stretford Gas Company.
Laboratory Assistant. Coventry Gas Department.
Laboratory Assistant (Industrial Appliance Manufacturers). No. 6332.
Mechanic. Kettering Gas-Works.
Works Foreman. Walsall Gas Department. Applications by Aug. 18.
Clerk. Bridlington Gas-Works.
Skilled Labourer (Repairing Mains, &c). Chiltern Hills Spring Water Company, Aylesbury.
Stoker. Braintree Gas-Works.
Stoker. Fazeley Gas Company.
Stokers. Milton Regis Gas-Works.

Tank Wagons for Hire.

Particulars of No. 6333.

Plant, &c., for Sale.

Exhausters and Steam Engines. New Barnet Gas-Works.

Plant, &c., Wanted.

Tank Wagons. No. 6330.

Patent Licences, &c.

Gas Mantles. D. Young & Co., 11 and 12, Southampton Buildings, W.C. 2.

Meetings.

Barnet Gas and Water Company. No. 139, Cannon Street. E.C. Aug. 29, 12.30 o'clock.
Irish Association of Gas Managers. City Hall, Belfast. Aug. 14. 11.30 o'clock.
Riddings Gas Company. 139, Cannon Street, E.C., Aug. 28. 2.30 o'clock.

TENDERS FOR—

Coal.

Aberystwyth Gas Company. Tenders by Aug. 14.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Abroad (in the Postal Union): £1 7s. 6d., payable in advance.
In payment of subscriptions for "Journals" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to Walter King, 11, Bolt Court, Fleet Street, London, E.C. 4

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
Palmerston House,
Old Broad Street, London, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
Andrew Stephenson, Gresham House, Old Broad Street, London, E.C. "Volcanism, London."

MEWBURN, ELLIS, AND PRYOR.
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 243 Holborn,
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham, and 45 & 47, Westminster Bridge Road, London, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
Repairs receive prompt attention.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"Braddock, Oldham," and "Metrique, Lamb London."

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—
BALE AND HARDY,
39, Victoria Street, Westminster, S.W. 1.

ALDER AND MACKAY, LTD.
(Established 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.

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SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C. 3.
Phone: Avenue 680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, St. Mary at Hill, London, E.C. 3.
Phone: Avenue 6680.

BENZOL PLANTS FOR GAS-WORKS.
BAGLEY, MILLS, & Co., Ltd.,
92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

ROBERT DEMPSTER & SONS, Ltd. Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD.,

with which is amalgamated WM. PEARCE & SONS, LTD. 36, Mark Lane, LONDON, E.C. Works—SILVERTOWN. Telegrams—"HYDROCHLORIC, FEN, LONDON." Telephone—1588 AVENUE (3 lines).

HUTCHINSON BROTHERS, Ltd.,

FALCON WORKS, BARNSLEY.

MANUFACTURERS OF

GAS METERS (Ordinary and Prepayment), "FALCON" INVERTED LAMPS and SQUARE LANTERNS for Street Lighting, INVERTED BURNERS and CONVERSION SETS for Street Lamps.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants. We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS BOLTON.

Telegrams—"SATURATORS BOLTON." Telephone 0848.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.

See Illustrated Advertisement, May 15, p. 268.

ENQUIRIES SOLICITED.

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.

C. & W. WALKER, LIMITED, DONNINGTON, NEWPORT, SALOP.

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bogore. 35 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan. OXIDE LIMITED, Brentford, MIDDLESEX.

SOUTH WALES TAR COMPANY,

MAESYCWMMER, near CARDIFF.

TAR WANTED.—Best Prices paid either at fixed Rate or Profit-Sharing Basis.

JOHN RILEY & SONS, Limited, Chemical Manufacturers. Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

WANTED. Immediately, two STOKERS (Over Military Age or Unfit for Service). Used to Shovel Charging, Engine, Boiler, and Exhausters. Eight-hour Shifts. Wages, 35s. per Week, *plus* 4s. War Bonus.

Apply to H. W. KAYE, Manager, Gas-Works, MILTON REGIS.

WANTED—A Capable All-Round, MECHANIC with knowledge of Fiddes-Aldridge Stoking Machine and Electrical Plant. Permanency to suitable man.

Apply, stating particulars of Age, Experience, and Wage required, to the MANAGER, Gas-Works, KETTERING.

STRETFORD GAS COMPANY.

CHEMIST Wanted, to Take Charge of Laboratory. Knowledge of Benzol Testing, Calorimetry, and General Gas-Works Analysis desirable.

Apply, by Aug. 8, giving Age, References, Experience, and Salary required, to H. KENDRICK, Engineer and Manager, Gas-Works, STRETFORD.

WANTED—A Clerk Experienced in Routine of Gas-Works Distribution Office (Ineligible).

Apply, with *Copies* of Testimonials, to the MANAGER, Gas-Works, BRIDLINGTON.

IRISH ASSOCIATION of GAS MANAGERS.

PRESIDENT: A. S. BROOK, Lisburn.

THE

ANNUAL MEETING

Of the Association

WILL BE HELD IN THE

COUNCIL CHAMBERS, CITY HALL, BELFAST,

ON TUESDAY, AUG. 14, 1917.

The Chair will be taken at 11.30 a.m. by the PRESIDENT.

BUSINESS: Reception by the Lord Mayor of Belfast—Councillor James Johnston; President's Address; Report of Committee, with Abstract of Accounts and Auditor's Report; Election of Scrutineers; Election of District Representative on Council of Institution of Gas Engineers; Discussion on the Formation of a Commercial Section, introduced by Mr. Reid, Ballina.

PAPERS TO BE READ.

"Intermittent Vertical Retorts for Medium-Sized and Small Gas Undertakings," by F. G. Ambler.

"Exceptional Difficulties Experienced in Administration of the Mallow Gas Undertaking," by P. J. Philpott.

By invitation of the President, the members and their lady friends will partake of light refreshments in Ye Olde Castle Restaurant, about 1 o'clock p.m.

By permission of the Gas Committee and Mr. Smith, the Engineer and Manager, members will be allowed to visit the Belfast Corporation Gas-Works on Tuesday afternoon.

The usual Dinner of the Association will take place at 6 p.m., at Ye Olde Castle Restaurant. Members are requested to apply at once for tickets, as the number must be guaranteed by Aug. 9. Tickets 4s. each.

On Wednesday, Aug. 15, an Excursion for members and lady friends has been arranged as follows: Train leaves the Belfast and County Down Railway Station at 10.50 a.m., arriving at Newcastle at 12.5 p.m. Dinner will be served at the Mourne Hotel, Newcastle, at 12.30 p.m. Tea will be served at 4 o'clock, so as to facilitate passengers going back to Belfast by the 4.25 p.m. train, or South by the Great Northern 4.55 p.m. train. Prices of Tickets, including Railway, Dinner and Tea, Fees and Gratuities, 10s. 6d. each. Tickets can be booked—outward journey by Belfast and Co. Down Railway, and return by Great Northern Railway to Belfast, or outward and return journey by Belfast and Co. Down Railway; but the route chosen must be specified in covering letter. No application can possibly be entertained after Aug. 9

G. AIRTH, Hon. Secretary and Treasurer.

Gas-Works, Dundalk.

GAS Stoker Wanted, Shovel Charging. Wages, 7s. per Twelve-Hour Shift, and 10s. per Week War Bonus.

Apply to the MANAGER, Gas-Works, Braintree, ESSEX.

STOKER Wanted, Shovel Charging. Wages, 6s. per day. Time-and-half for Sundays. Holiday with pay.

Apply to Mr. F. L. WIELAND, Secretary, Fazeley Gas Company's Office, 22, Market Street, Tamworth.

ASSISTANT Required for the Laboratory of a firm of Industrial Appliance Manufacturers.

Apply, by letter, giving details as to Age, Experience, and Salary required, to No. 6332, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CHILTERN HILLS SPRING WATER COMPANY, AYLESBURY.

WANTED. — Skilled Labourer for Repairing Mains, in Tring district, and to Assist in Repairs to Deep-Well Pumps, Cleaning out Boilers and Reservoirs; also Work General to Pumping-Station.

House, Garden, and Coal provided at Dancers End Station.

Applicants must state Wages required, together with Age and Qualifications, to H. A. CALLON, Manager.

COUNTY BOROUGH OF WALSALL.

(GAS DEPARTMENT.)

THE Gas Committee require, at once, a Competent WORKS FOREMAN—one Ineligible for the Army.

Application in own writing, stating Wages required, and enclosing Three Testimonials, addressed to the undersigned, and marked "Works Foreman," not later than the 18th inst. No House provided.

B. W. SMITH, Engineer and Manager.

Gas-Works, Pleck, Walsall, Aug. 1, 1917.

COVENTRY CORPORATION.

(GAS DEPARTMENT.)

CHIEF Laboratory Assistant Wanted. Duties consist of General Gas-Works and Carburetted Water-Gas Plant routine, and Opportunities of Obtaining Experience in the Control of Benzol, Sulphuric Acid, and Other Bye-Product Plants. Previous Experience on a Gas-Works Essential.

Apply, stating Age, Experience, Qualifications, and Salary required, to

FLETCHER W. STEVENSON, Engineer and General Manager.

Gas-Works, Coventry, July 13, 1917.

WHITEHAVEN UNITED GAS COMPANY, LIMITED.

THE above Company invite Applications for a PRACTICAL GAS MANAGER Annual make, about 40 Millions. Candidates must have Experience in Sulphate of Ammonia Manufacture and Carbonizing Methods.

Applications, in writing, stating Age, Qualifications, Experience, and Salary expected, with *Copies* of Two recent Testimonials, to be sent to the undersigned, not later than Aug. 25, 1917.

J. H. STUDHOLME, Secretary.

67, Lowther Street, Whitehaven.

FOR HIRE. — Ten Clean Railway TANK WAGONS. Capacity about 2500 gallons. Immediate delivery.

Address No. 6333, care of MR KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FOR Sale. — Two Sets of Bryan- Donkin Twin EXHAUSTERS and STEAM-ENGINES, of 40,000 cubic feet per hour, with 12-in. and 6-in. Connections and Valves, Steam Regulator, &c. In good order.

F. J. BANCROFT, Gas-Works, NEW BARNET.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

GASHOLDERS and Other Plant Wanted, either for Re-use or Scrapping. Dismantling Specialists.

FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, LEEDS.

TANK WAGONS.—Wanted to Purchase, suitable for Tar and Gas Liquor Traffic.

Address No. 6330, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

GAS PLANT for Sale. — We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

ABERYSTWYTHGAS COMPANY.

THE Directors invite Tenders for the Supply of 5500 Tons of SCREENED GAS COAL, COBBLES, or NUTS, covering Twelve Months, delivered at Aberystwyth Station.

Tenders, with Analysis, to be Delivered on or before the 14th day of August, 1917.

Further Particulars can be obtained from the Undersigned.

J. GAUNT, Engineer and Manager.

Gas Offices, Aberystwyth.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Offices of the Company, 139, Cannon Street, London, E.C., on Wednesday, the 29th day of August, 1917, at half-past twelve o'clock precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th of June last; to declare a Dividend; and to transact the General Business of the Company.

The TRANSFER BOOK WILL BE CLOSED from the 16th to the 29th of August, both inclusive.

By order of the Board, ERNEST W. DREW, Secretary.

Offices: 139, Cannon Street, London, Aug. 2, 1917.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors of the above Company will be held at the Offices of the Company, No. 139, Cannon Street, in the City of London, on Tuesday, the 28th day of August, 1917, at Half-past Two o'clock in the afternoon, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last; to declare a Dividend; and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 15th to the 28th inst., both inclusive.

By order of the Board, ERNEST W. DREW, Secretary.

Offices: 139, Cannon Street, London, Aug. 3, 1917.

THE Proprietors of British Patents Nos. 25,516 of 1906, 25,588 of 1906, 11,152 of 1908, 28,943 of 1910, 4763 of 1912, 4772 of 1912, 8429 of 1912, 20,291 of 1912, and 11,591 of 1914, relating to the MANUFACTURE OF INCANDESCENT GAS-MANTLES," desire to enter into Negotiations with one or more Firms in Great Britain for the SALE of the PATENT RIGHTS or for the grant of LICENCES to Manufacture under Royalty.

Inquiries to be addressed to D. YOUNG & CO., Patent Agents, 11 & 12, Southampton Buildings, London, W.C. 2.

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXXXIX., No. 2831.] TUESDAY, AUGUST 14, 1917. [69TH YEAR.

EDITORIAL NOTES.

Oil Supply a Factor in Shaping the Industry's Course.

THERE is one central dominating fact facing the gas industry to-day; and it is that something has to be done (despite the higher costs than of old that assail) to produce a suitable heating gas that can be sold at as cheap a rate as possible. We have kept this matter to the front by advancing various arguments which affect both the present and the prospective positions, and which arguments are concentrated in costs, capital, competition, and economy. We referred last week to the question of residual products; this week oil invites consideration, and in a larger measure than the span of the difficulties specially appertaining to the period of the war. Some people appear to think that the present position of oil is solely due to the war situation of shipping, and that with the construction of more tank-steamers, matters in respect of this commodity (of which the British gas industry in normal times has used millions of gallons per year), will be righted. The question of oil is one which must, however, be considered farther ahead. Well-derived oil is with us an import; in America, it is a home product. But has it not been noted that even in America the gas industry is returning largely to coal carbonization, and that the manufacturers of carburetted water-gas plant there now talk more freely of blue water gas? When, a few months ago, noticing the new catalogue of the United Gas Improvement Company, we (on the authority of the catalogue) made use of these words: "Again, when the Company became convinced of "the great improvement possible through more scien- "tific methods of coal carbonization, and when *in view* "*of the wide fluctuations in the price of oil* their efforts "were directed to the refinements in coal-gas practice, "their engineers evolved the 'U.G.I.' system of intermit- "tent vertical retorts." In the course of the discussion of calorific standards in the States, the representatives of the gas undertakings have time and again impressed upon the Commissioners who govern the making of regulations that the changes in the conditions of oil—variations of supplies, quality, and prices—have put them in a position inferior to that they were in in the past so far as the grade of gas produced is concerned. A recent reference to calorific standards in America alluded to a petition to the Public Service Commissioners by the Indiana Gas Association asking that the calorific standard for artificial gas should be lowered; one of the reasons advanced being that, *owing to the scarcity of gas-making materials*, it is practically impossible to produce gas which will reach a 600 B.Th.U. standard, regardless of the exceptionally high cost of such material. In New Jersey, too, the companies are desirous of relief from a high calorific value standard on the ground of the costs of coal and oil. The fact of the matter is that the world's demands for oil are growing at a faster rate than the rate of increase of output, and that the drafts on the known subterranean stores of oil are reducing the period within which exhaustion must be anticipated. This bears upon the questions of the future availability and prices of oil for gas-making, and upon that of preparations betimes for shaping our practices in regard to water-gas manufacture, so as to make either the use of oil unnecessary or much more limited than before. There are gas-works in America whose major gas production was of the carburetted water-gas variety which are now reversing the positions of that gas and coal gas.

Authorities on the subject tell us that it is impossible to estimate precisely the extent or capacity of subterranean oil reservoirs. They may yield enormous quantities of oil for a long time before signs of exhaustion are manifest, or they may have only limited existence. There may for some be comfort in the thought that perhaps in these circumstances estimates may have gone all astray, and that the future market conditions of oil may not be subjected so much as preconceived to the vast expansion of demand, and to the simultaneous decline in the rate of the increase of supply. There is also uncertainty regarding fresh discoveries. But uncertainty cuts both ways; and as to new discoveries of sources, it may be taken for granted that those most easily accessible are the ones that have been discovered and as a consequence developed first. Perhaps the Fothergill Lectures on "Motor Fuels," which (the late) Prof. Vivian B. Lewes delivered, early in 1915, at the Royal Society of Arts, have, in the hurly-burly of these times, been almost forgotten. Let us recall a point that he then made. The need of substitutes, he said, was dependent not so much on the fact that the natural oil supplies of the world are likely to give out in 300 or 150 years' time, or whatever period various authorities might put forward, as that *within a very short time*—say, fifty years—the natural supplies of oil would be diminished to such an extent that the depth from which the oil would have to be obtained will render them practically commercially unavailable. Prof. Lewes had doubtless in mind then the large progressive rate of increase in demand for motor, marine, and power purposes generally; but we venture to think he had not then pictured an increase in the demand for these purposes such as has since taken place in the world, and such as the signs of the times bid us to expect. In the "JOURNAL" for March 2, 1915, some figures were published which showed that the world's oil production in 1914 was 58,030,000 tons; and that of this quantity the United States produced 42,000,000 tons, which is equal to about 70 p.ct. of the total. This establishes the primary importance of the United States in all considerations affecting output and price. In the "Petroleum Review" there has recently been published an article based upon advance abstracts which have reached our contemporary of the "Year "Book" of the United States Bureau of Mines. Bearing on what Prof. Lewes said nearly two-and-a-half years ago, we have this significant statement: "According to the authors, "at the present rate of consumption, the estimated supplies "in the United States are sufficient to meet present needs "*for a comparatively short period*, conservatively estimated to "be from 25 to 30 years, taking no account of the increasing "demand for petroleum and its products. This estimate, "says the Bureau, not only includes the oil-fields already "known and developed, but makes liberal allowances for "undiscovered fields in prospective oil territories." Only some 25 to 30 years, without taking into account additional demand, and after making "liberal allowances" for new supplies! Owing to the great demand the last year or two for crude petroleum, there appears to have been a feverish drilling of wells during 1916 in search of fresh supplies; but "the production to-day is little, if any, more than the pro- "duction of 1915, nor have any large new fields producing "petroleum been developed."

For an industry that has relied so largely upon oil for gas making, there is in these statements a warning over which to ponder. There is also in them an incentive to enter into the business of oil and spirit production from the carbonization of coal with the knowledge that demand is increasing with giant strides, and that therefore the business should be increasingly lucrative, which considerations give better hopes for tar. No doubt the tar distillers are keeping this aspect of the question well in mind. Just take one piece of information culled from the report of the Bureau of Mines. Motor spirit is indispensable to industrial progress. There

are at the present time over three million automobiles in use in the United States. The manufacturers there are turning out approximately two million new machines this year, and expect to increase the number each succeeding year. The average annual consumption of motor spirit is more than ten barrels per automobile; and it is estimated that the United States will require 2000 million gallons of motor spirit for the year 1917. Where is this motor spirit coming from? The situation can, of course, be partly, but only partly, met by converting some of the less valuable products of crude oil into motor spirit. Other sources must be cultivated; among them gas-works for benzol. Upon the facts as presented in the report, the "Petroleum Re-" view" says: "We are forcibly reminded that the greatest " conservation in consumption is necessary if the genera-" tions to come are to enjoy the benefits of the free use of " petroleum products, for Nature's resources are rapidly " giving out." The report of the Bureau points an accusing finger at both producers and users over the neglect to conserve supplies, and to utilize them to the greatest advantage. It points out that 20 p.ct. of the production is being exported, 25 p.ct. used as fuel under boilers, of the remainder probably about one-fourth is wastefully utilized. Thus 70 p.ct. in all is being used in a manner that must be considered anything but conservative for so valuable and so (relatively to demand) scarce a product. And then, speaking of the gas-works of the United States, and through them to gas undertakings abroad using American oil, the Bureau remarks: "As an example of wasteful utilization, " three-fourths of our artificial gas is made from petroleum, " notwithstanding the fact that coal has been, and is, used " for this purpose, and would be used altogether except for " the reason that the gas manufacturer is able to buy petro-" leum cheaper. At the present rate of production, it is " estimated that our coal supply is adequate for more than " 3000 years. Clearly we should not use petroleum for fuel " under boilers or for gas manufacture, or in any way to com-" pete with coal, when the oil supply is so limited."

There is the hand-writing on the wall; there is fresh argument in the case for the production of an economical heating gas from coal at (perhaps) somewhat lower temperatures, with dilution of the product by a well-made blue water gas low in inert constituents. In the general position, there is fresh reason for developing the manufacture of gas on lines that will enable us, without detriment to the provision of gas giving a good flame temperature, to contribute more than hitherto to our home provision of oils and spirit, which will be required in greater and still greater quantity year by year. Upon this we may take a firm stand when considering and discussing the composition and quality of town gas—that oil supplies for gas making in the time beyond the war are going to be dearer than before the war, and supplies must as the years pass tend to diminish. In other words, the *ante-bellum* vagaries of the oil market are, on the return of peace, going to be intensified, and that (there is some confidence in saying) seriously.

Black and Bright Aspects of the Half-Year's Trading.

There has been very full exemplification now of the impossibility, under capricious war conditions, of the most astute of gas administrators gauging with accuracy far ahead the probable financial outcome of their operations. To defeat calculation, there appears to have been a sort of impish conspiracy on the part of everything and everybody that or who has any influence on the situation outside gas circles. Adverse market conditions have heavily stormed the industry, Government officials have been industriously doing their best to set limitations upon the industry to its disadvantage and other people's advantage, the enemies of the country have among their other sins bestrewed the seas with danger and indirectly curtailed the industry's traffic conveniencies, and atmospherical conditions (though in the past half-year they have been kind) have an erratic way with them that adds to the accumulation of complexity and uncertainty. The combined effects have been anything but pleasant. The customers of the South Metropolitan Gas Company used to enjoy a good quality gas at 2s. 2d. per 1000 c.ft.; the price went up in consequence of the war to 2s. 10d.; the Directors believed that circumstances had composed themselves about twelve months ago to such an extent that they could safely lower the price to 2s. 8d.; for a year the consumers have enjoyed the reduced charge; but, with great reluctance, the Directors have had to resolve to raise the price to 3s. 1d. as from Midsummer. The 2s. 8d. price is giving the shareholders a dividend at the rate of £4 13s. 4d. p.ct. per annum, less a substantial income-tax. What the dividend will be, under the sliding-scale with the other 5d. attaching to the price, we will not calculate just now. Sufficient for the day is the evil thereof, though the Chairman of the Company (Mr. Charles Carpenter, D.Sc.) is among those who agree that the sliding-scale requires remodelling to fit inordinate circumstances and new values. It is the fate of the gas industry that it should possess the singular example of the market value of a primary product not having ascended in consonance with the war cost of production; the peace-framed sliding-scale having intervened and deterred any ascent of price beyond what is required to pay the sliding-scale sanctioned dividend, inasmuch as a further increment of price would badly threaten the remnant of some companies' dividends. Through the prevailing conditions—though as far as possible firmly grappled with by the directors and officials—a large part of the capital of the gas industry is being ill-rewarded, and co-partner workmen are suffering a loss of bonus, though enjoying dividends on their investments as are other proprietors, and participating in war bonus owing to the higher cost of living.

The Directors of the South Metropolitan Company have no difficulty in showing justification for having raised the price of gas to 3s. 1d. To pay the six months' dividend, the whole of the balance of £33,660 brought into the half-year will be absorbed, and a further £1742 is required. It is, however, seen that the war bonus and war fund for the half year claim no less than £104,051, or 4d. per 1000 c.ft. Enhanced charges for freight have made the gross cost of coal £181,665 more (or £82,731 more, less residuals) for an additional 53,322 tons carbonized; and interest on temporary loans and deposits has amounted to £25,409, as compared with £6833 for the pre-war half-year (June, 1914). Prudence calls for larger stocks, and larger stocks necessitate the borrowing of more money. And if there is one thing the Directors of the Company are minded to do for this next winter—having heeded the warnings of the Coal Controller and the dictates of last winter's experience—it is to protect the Company's and consumers' interests by heavily storing coal betimes. By June 30, the Company had in store 310,530 tons; the half year having commenced with a stock of 136,269 tons. The value of the coal in store as entered in the balance-sheet is £463,386. No doubt the 310,530 tons have already been added to; but the protective power of such a quantity is to be seen in the facts that at June 30, 1916, there was in stock 128,516 tons (with a balance-sheet value of £149,255), that at June 30, 1914, there were 181,056 tons in store, with a money value attached of £137,573; and that 559,105 tons were carbonized in the December half of 1916. Proprietors and consumers will appreciate what this protective coal-storing means when it is pointed out that the balance-sheet value of the coal in store (including all expenses) at June 30, 1914, was 15s. 2·3d. per ton, compared with £1 9s. 1·1d. for that now in store. The stock of expensively acquired coal has an intrinsic value for the South of London generally.

The figures are remarkable; and so are those referring to the trading of the past half year. It is noticed that 622,351 tons of coal were carbonized, or an increase of 53,322 tons. From this quantity an average of 12,498 c.ft. of gas per ton were made (comparing with 12,241 c.ft. in the June half of 1916), despite the inferior cleansing of the coal shipped to the Company. These figures recall the severe weather of the opening weeks of the half year, and the then considerable use of gas-fires. The 622,351 tons of coal cost £875,489, or, less £554,385 for secondary products, a net figure of £321,104. For the 569,029 tons carbonized in the June half of 1916, £693,824 was spent, or, less £455,451 for secondary products, £238,373. The gross cost of coal last half year worked out to £1 8s. 1·6d. per ton (or 10s. 3·8d. net), as against £1 4s. 4·6d. in the first half of 1916 (or 8s. 4·5d. net). From every point of examination, it is seen how war influences have been and are hoisting-up prices. It will have been observed that the bye-products fortunately contributed an additional £98,934 to revenue. To this increase, coke, producing £365,545, subscribed £69,531; breeze, with £7634, subscribed £6076; tar and tar products, producing £87,797, subscribed £7655; and sulphate of ammonia, yielding £93,408, subscribed

£15,672. What a difference, particularly in respect of coke, between last half year and the June half preceding the war! At June 30 just past, there were only 29,902 tons of coke in store; while at June 30, 1914, 105,746 tons. Then the Directors had to report that "the values of all bye-products "have weakened, especially coke." It is something to be thankful for that there is this bright spot in gas accounts at the present time.

There is another. While gas capital suffers heavily from legislative conditions that refuse to bend to the extraordinary circumstances of the war, and while consumers are paying more for gas, but not in proportion to the increases in outgoings or to the advances in the retail prices of other commodities, the gas business is enlarging through household coal delivery difficulties, and the adventitious boostings of consumption due to lowering skies and falling temperatures. During the past half year, there has been the satisfactory increase of 12 p.ct. in gas sales, which means that, with a total consumption of 7,480,980,000 c.ft., there was an increase of 806,691,000 c.ft., compared with the June half of 1916. There is a supremely satisfactory feature about this figure. No less than 779,734,000 c.ft. was due to private consumers, and 26,957,000 c.ft. to the partial relaxation in public lighting. But there is something else that is satisfactory. Despite all the war-time lighting restrictions, the gas business of the past half year has overlapped the June half of 1914 by 597,152,000 c.ft. But as public lighting consumption last half year was less by 41,416,000 c.ft. than in the first six months of 1914, the increase in consumption by private customers last half year, compared with the pre-war half, was 638,568,000 c.ft. It is owing to this increased consumption that the revenue from gas—notwithstanding the 2s. 8d. price, as against 2s. 10d.—advanced by £55,476, so carrying it up to £976,804. To the continued enhancement of the stability of the gas business is due the fact that the rental of meters, stoves, fires, and gas-fittings moved upwards, by £13,099, to £145,589. These good additions to the revenue, together with the income from secondary products, made the total receipts for the half year £1,678,214, or an increase of £167,603. Apart from coal, there are fluctuations up-and-down in the items on the expenditure side compared with the corresponding period of 1916; but we will not enter into the details here. Suffice it to say the total expenditure amounted to £1,505,990, or an increase of £225,558. The difference between the increased income and outgoings, of £57,955, is the sum by which the amount transferred to the net revenue account (£172,224) falls short of that (£230,179) which was transferred at June, 1916.

Heating Gas.

Last half-year's trading of gas undertakings supplies such a long arm to the industry's "direction-post" that it is impossible to miss it. The difficulties with coal supplies and the severity of the weather caused a big draft on the mains of gas undertakings everywhere; and as the half-year's accounts begin to flow in, we see this represented in substantial percentage increases in the sales. Illustrative is the South Suburban Gas Company; and at the meeting of the proprietors last Friday, Mr. Charles Hunt (the Chairman) pointed to the lesson of these increases. The Company's half-year's increase was 17·1 p.ct. Where did this increase come from? The records of the thermometer and a figure that Mr. Hunt gives tell that lighting had no part in it, but that the shrinkage in lighting consumption promoted by the Government regulation was made up and the additional sale of 17½ p.ct. was occasioned by heating use alone. The figure to which we refer is the 15·9 p.ct. by which the sales of gas increased in the Midsummer quarter alone, which period was entirely covered all but a week by the Summer Time Act; a large proportion of the increase being contributed by ordinary meter consumers as distinguished from the prepayment ones. These facts are important in the educative work that has to be carried on. We have to foster the idea that it is "heating" gas and not "lighting" gas that is required, and to make it known that the percentage of suitable and readily aerated combustibles in the gas is as important as calories.

There was reference by Mr. Hunt to the non-success of the Company in approaching the Board of Trade with the request that their calorific standard of 475 B.Th.U. should now apply to the one-fourth of the area to which, through the obstructive tactics of ignorance in these matters, the illuminating standard still applies. He remarked upon the tenacity with which the Board of Trade are clinging to the 500 B.Th.U. standard, as though there was some particular virtue in the figure, and was the "end-all" of the question of a suitable gas. We may expect something else when the scientific aspects of the matter are known in Government circles. But we cannot wholly blame the Board for declining to shift their ground until properly enlightened. When it is realized how slow the gas industry has been to appreciate that calorific power is not everything, and that an inordinate amount of inert constituents in gas, or a quality of gas which—requiring a large amount of air for complete combustion—compels the introduction of an excessive amount of flame temperature impairing nitrogen into it, is not the best for the consumer, we must forgive the Board of Trade for not realizing these things at first blush. We hope the enlightenment will come *via* the Board of Fuel Research, and in good time consistent with thorough investigation.

The South Suburban Company under the stimulus of the lessons of the war, and the development of plans for new riverside works, were among the first to turn attention to this question of gas composition; and this is not surprising in view of the active and practical part that Mr. Hunt has taken in opposing the saddling of the industry with high calorific standards. His old beliefs on the subject have only been hardened by the lessons of the war; and this is seen by certain passages in his address to the proprietors of the Company the full depth of the meaning of which it does not require any great power of penetration to discover. "It "may be safely said," he remarked, "that a return to pre-"war conditions in their entirety is out of the question, be-"cause this would not be compatible with the fullest con-"servation of the nation's fuel resources, which it must "henceforth be the aim of everyone to promote. The war "has taught us many things; and it would be the height of "unwisdom to ignore its lessons." Then on the question of inert gases, Mr. Hunt added: "Our investigations have al-"ready convinced us that the presence of these gases in the "gas as delivered to the consumers, in so far as this is pre-"ventible under the ordinary conditions of carbonization, "is prejudicial to both buyer and seller. Accordingly, the "utmost is being done to limit their presence as much as "possible, and such limitation to the greatest practicable ex-"tent will be kept steadily in view as one of the aims of the "new carbonizing plant which, so far as can be foreseen, "will have to be provided immediately after the war." The fullest conservation of the nation's fuel resources means the utilization of coal in such a way or ways that its valuable constituents are not lost, and at the same time there shall not be over-production of the major constituents. These conditions require that the destructive burning of bituminous coal shall cease within economic bounds, that it shall be carbonized, and that the quantity carbonized shall be restricted by the utilization of coke within practicable limits for gas making—thus, it is expected investigation will show, furnishing a mixed gas of good percentage combustible composition, and at the same time helping to keep the secondary products nearer to the lines of absorption than would be the case if coal were entirely used for gas making under the prospective conditions of gaseous fuel demand. For the gas industry the lessons of the war are of fertile character.

Concentrated Gas Liquor, Pyrites Acid, and Tar Distillation.

The annual report of the Chief Inspector under the Alkali Works Regulation Act (Mr. W. S. Curphey) is again a compilation of considerable technical interest for all coal carbonizers and makers of sulphate of ammonia, or users of cognate processes. It also shows how the works and processes under his surveillance have, like most other affairs of life, become largely subject to changes imposed by the war. The greater part of the report is taken up with a study of the direct process of sulphate of ammonia production, in continuation of the investigation started, but not completed, the previous year, but which showed that there were two problems that demanded research in connection with the process—the one being the relative low make of sulphate realized per ton of coal, and the other the effects upon gas-purifier action where the process has been adopted. Both problems Mr. Curphey last year considered were capable of solution, and amenable to control. The report now issued pursues the subject; and it is intended to publish, in this and succeeding issues of the "Journal," the major part of the section dealing with the investigation

To the conclusions, special attention will be drawn in an article which will probably appear next week.

In other parts of the report, we see the working of war influences. Both in England and Scotland, the effect of the price and shortage of sulphuric acid is discerned in changing procedure. In several works where only sulphate of ammonia was previously made, concentrated ammoniacal liquor is now produced. There used to be attractions for the smaller works in this simple liquor distillation process, owing to the modest amount and character of the apparatus required, and the absence of chemicals. But, in the report from Scotland, it is noticed that plans are in progress for the conversion of "several large sulphate of ammonia units" to the production of concentrated ammonia. It will be observed that in the returns given by Mr. Curphey showing the production of ammonia expressed in terms of sulphate, no less than 70,987 tons (of the total of 433,703 tons) were in the form of concentrated ammoniacal liquor; and he, too, anticipates a considerable further extension of the process among sulphate makers.

Another point alludes to the use of crude pyrites acid for sulphate production, and the difficulty experienced with the precipitation of metallic sulphides in the saturator. It is interesting to observe that the Inspectors find that the practice so long followed in Scotland—of using a cheap oil, crude tar, or the like for facilitating the removal of the metallic sulphides—is being applied in England. The oily material floats the impurities to the surface of the liquid in the saturator; and so with the lower-priced unpurified acid a white high-grade salt results. It is probable that originally the idea came from England; at any rate, the same practice is well known in other countries and among students of the science and art of sulphate making. Several methods, in fact—some dating many years back—have been proposed for removing the iron and arsenic accompanying pyrites acid. Among them (Lunge reminds) Meadows, in the year 1884, proposed the use of a small quantity of tar, pitch, or other oily substance which formed a scum on top of the saturator; and by this means the removal of the arsenic and iron was facilitated. Other workers followed along much the same lines, so that there is nothing novel about the idea so far as England is concerned. The prejudice against anything but white sulphate seems to be somewhat decreasing, though, of course, the pyrites acid should be made from pyrites containing as little arsenic as possible. When this precaution is taken, although the sulphate is greyish looking, it is as valuable as the best white for manurial purposes.

It is evident some of the tar dehydration plants at gas-works are giving trouble to Mr. Curphey and the District Inspectors through, in part, the inadequacy of skilled supervision. So far as this is the case, it must be largely due to shortage of staffs through the claims of the war. But there is a more serious matter. Attention is called to the faulty design of some continuous tar-distilling plants, and to the insufficiency of condensing power, which results in the escape of objectionable vapours and the loss of benzol and toluol. There is reproach in the brief reference to this matter; and gas engineers must see to it that where there is fault, there is rectification as quickly as the barricade of departmental permits can be penetrated, and contractors have the opportunity in time, material, and men to give the matter attention. In the work that has had to be hastily undertaken to comply with the requirements of the Ministry of Munitions, gas engineers and chemists are conscious of the existence of defect in detail, to which they will not submit a day longer than circumstances compel.

Sulphate of Ammonia—Present and Future.

Producers of sulphate of ammonia will, on consideration of certain proposals of the Corn Production Bill, contemplate with still greater outraged feelings their position in relation to the prices fixed for sulphate with that of the farmers whose interests are being tended by the Government with a generosity of which we should like to experience a little in the gas industry. In the discussion on the Bill in Parliament, one of the clauses that came in for heavy criticism proposes Government payments to growers where the average price of wheat and oats is less than the minimum price fixed under the Act, except where this is due to negligent cultivation. In every way the Government (who are taking power also to enforce the proper cultivation of land) are evincing a solicitous regard for the farmer's profits, even at the expense of the makers of sulphate of ammonia. The President of the Board of Agriculture (Mr. Prothero) laid it down as a principle during the debate on the Bill in the House of Commons that the man who increases his yield per acre by the use of fertilizers is surely just as qualified for the benefit of the Government insurance as the man who increases his arable acreage. There cannot be use of fertilizers without their production; and therefore it should follow that those who produce sulphate of ammonia ought, in these times of weighty expenditure, to be considerately dealt with. The value of sulphate of ammonia in these days, when it is sought to make the country more self-supporting than ever in regard to food, was shown by Mr. Prothero in a manner which will appeal to the public imagination. He stated that in the spring of the present year, there was sold to farmers nearly three times the amount of sulphate of ammonia that was sold in the corresponding period of last year. He asked the House to realize what this represented. Each hundredweight of ammonia meant an additionol amount of wheat which would feed a man for the whole of a year on Lord Devonport's rations. He hoped, and had every confidence from what has happened in the past, that they would be able to multiply by five times the amount of sulphate of ammonia sold to the farmers for the harvest of 1918. More to the good; but let it be sold at a price that will give the makers a respectable profit.

Fertilizers from Other Sources.

In articles in the "Journal," it has from time to time been pointed out that the market conditions for fertilizers are going to be entirely transformed after the war, and that both this country and Germany will look out upon a new world in this regard when ships can again sail the seas and produce be exported without permits, licences, and so forth. Various countries that used to supply British sulphate of ammonia with markets have, through the war, shipping difficulties, and retention at home of our own produce, had to develop their own production of fertilizers—both from the carbonization of coal and the fixation of the nitrogen of the atmosphere. There will in future be no control over this latter movement other than that of demand. Now the Electrical Institute of South Africa have come to the conclusion that calcium carbide and other nitrogen products can be profitably made there so as to avoid their importation. The cost of manufacturing calcium carbide is computed to range from £13 16s. per ton for an output of 2600 tons per annum down to £10 10s. per ton for an output of 10,000 tons per annum. For calcium cyanamide, the manufacturing cost is reckoned at £9 per ton with an output of 4000 tons per annum. This is taking electric power at a cost of 0·35d. per kw.-hour. What with Australia and Canada considering the question of developments along the atmospheric nitrogen lines, our overseas trade in fertilizers looks like encountering restriction or stiff competition from our Dominions as also from other countries—notably Germany, Norway, and America.

Car Driving by Gas.

Through the utilization of gas in place of petrol for the driving of motor buses and commercial motor cars, the gas industry is rendering further help in relieving the stress of war conditions. Petrol is a luxury to-day; gas seems to be every man's friend in this hour of national need. It is recorded by "Commercial Motor" that—we take it apart from buses and other passenger conveying vehicles—there are now commercial motors to the number of 350 fitted with flexible gasholders; and this means the displacement of the use of some 700,000 gallons of petrol per annum. It also means that the carrying power of all these vehicles is constantly available, which would not be the case under the restricted doling out of petrol. Every reference that is made to the subject of the use of gas for such purposes—whether by the motor papers, by the users of motors, by "F.W.G." (as last week), or by Mr. J. G. Clark in the informative report published in the "Bulletin" of the British Commercial Gas Association—shows that material economy is to be found on the side of gas. The great question is how to turn this proved economy into a permanent one, because flexible gasholders do not help to make cars or buses things of beauty; and they can merely be regarded as temporary expedients. The only advantage that petrol has over gas appears to be that it contains a large amount of energy in a small space. But gas, besides being economical, asks for no prepurchase and no storage, it conduces to clean cylinders, it adds

to comfort by the absence of trouble due to injector stoppage, and there is with it complete elimination of starting difficulties in cold weather.

Small Space Gas Storage.

The discussion in the report by Mr. Clark of gas pressures and gas-carrying cylinders leaves us a little more hopeful that the economy and other advantages of gas for use in place of petrol will eventually be permanently reaped by a solution of the problem as to how to carry gas without unsightliness and without unduly promoting the disadvantages of weight and reduced carrying capacity owing to that weight. With the saving to be effected by gas, however, it will certainly be profitable to relinquish something in order to gain the money advantage. To this end, when war ceases and greater liberty is given to experimental work, there will be a prosecution to a proper conclusion of this matter of gas storage for car driving. Meantime, we have received from Drogheda, and publish in other columns, details of an extremely light cylinder which has been specially made for the carriage of compressed gas; and this should be brought under investigation by Mr. Clark. As pointed out by an article in our editorial columns, it has to be remembered that the world's production of road cars of all descriptions is increasing enormously; the world's production of petrol and benzol is not increasing *pari passu*, and benzol is wanted also for other than motor car purposes. There are plenty of good reasons for not letting this subject slip into oblivion, as other of the war lessons are likely to do after we get under the narcotic influences of a restored peace.

The "Particulars as to Directors" Act.

At the beginning of this month, a measure received the Royal Assent which it is hoped will render impossible the carrying on by an alien enemy of a business in this country, by means of the formation of a limited liability company. The title of this well-intentioned Statute is the Companies (Particulars as to Directors) Act, 1917; and it has been called for by the fact that the Registration of Business Names Act, 1916, which requires the registration of firms and individuals carrying on business here under trading styles which do not give an indication of the names of the principals, falls short of the needs of the case. The fault was pointed out in various quarters at the time—namely, that by failing to bring limited liability companies within the scope of the Act, an easy way was provided for those who might desire to evade its provisions. If from motives of modesty or from any other cause whatever there should be a wish to hide the real identity of those carrying on a business, all that it has been necessary to do was to convert the business into a limited company. The new Act extends to directors of companies, or persons who occupy the position of directors, and any persons in accordance with whose directions or instructions the directors of a company are accustomed to act, the provisions in the earlier Act which relate to partners in firms. It applies to all companies registered under the Companies Acts, as well as to those incorporated abroad who have a place of business in this country. The main effect of the Act, as was explained by Mr. H. W. Jordan, in the lecture he delivered before the Secretaries' Association a few days ago, on directors is that there have now to be filed with the Registrar their present christian name or names and surname, any former christian names or surname, nationality, nationality of origin (if other than the present nationality), usual residence, and any other business occupation (if any). There are additional obligations placed by the Act upon companies registered between Nov. 22, 1916, and the 2nd inst. This new legislation should be of the greatest use in assisting people to ascertain precisely with whom they are doing, or are about to do, business.

Against the Defence of the Realm.

The Ministry of Munitions are asking gas undertakings to maintain the output of benzol and toluol, and now to make as much tar and as rich as possible by using lower temperatures, under conditions of which probably direct information has been received. The Ministry, too, appeal to the public to consume as much gas as they can for light, heat, and power, in order to enable gas-works to comply with their request for more tar and more benzol, toluol, and other necessaries. But while they are making these appeals, there are other Government Departments that are senselessly doing their best to diminish the consumption of gas. This is an old grievance—a grievance due we believe to electric lighting (but not gas) having influential friends at the Office of Works. If there were a gas engineer or two there as well as electrically-trained men, we might get along with equally divided bias producing an equality of treatment. In our "Correspondence" columns to-day, Mr. J. E. Kenshole, of Merthyr Tydfil, points to an instance of absurd departmental procedure while the Ministry of Munitions are doing their utmost to get more and more of certain products from the carbonization of coal and the greater use of gas. The Inland Revenue Department are at Merthyr taking premises recently fitted throughout with modern gas-fittings; but these are being removed, and electric light fittings installed. Other Inland Revenue offices in the town are undergoing similar treatment. The Defence of the Realm Act is an instrument of extensive power; and it is a pity the Ministry of Munitions cannot bring it to bear upon the officials responsible for acts that reduce the capacity of gas-works in providing materials for the prosecution of the war and the defence of the Realm.

Coal Rationing and Gas-Fires.

Touching in another direction the request of the Ministry of Munitions for greater coal-gas and tar output, it may be remembered that, in the first editorial article of July 31, it was remarked: "The Coal Controller might consider whether he cannot secure a counterbalance to the increased supply [of coal] to gas-works by, under his new household coal-rationing scheme, reducing the allowance per house where gas-cookers and gas-fires are installed, so ensuring their use instead of coal." Since then, in a notice of the rationing scheme in a much-read public paper, we came across this announcement: "Each household is to be rationed on the basis of the number of rooms occupied and used, having regard to the number of gas-fires in use." If this condition as to gas-fires were not attached to the rationing scheme, the house fitted with them would be in a much better position than the house without them. This would not be in the public interest, seeing that economy in coal transport, as well as an increase in the quantity of the bye-products of coal carbonization, is badly wanted.

PERSONAL.

Mr. Stewart, the Distribution Foreman at the Airdrie Corporation Gas-Works, has been appointed Manager of the Blairgowrie Gas-Works.

Last Saturday a presentation by the employees of the Dundee Gas-Works was made to Mr. and Mrs. George Keillor on the occasion of his leaving to take up his duties as Engineer and Manager of the Greenock Gas-Works. The parting gift was a handsome suit case and silver-mounted umbrella, which, in felicitous terms, were handed over by Mr. Alexander Yuill, the Engineer and Manager.

A portrait of Mr. Robert Martin-Holland, C.B., the new Director of the Gas Light and Coke Company, forms the frontispiece of the August issue of the "Co-Partners' Magazine." As already recorded in our pages, Mr. Martin-Holland succeeds Mr. J. Douglas Walker, K.C., whose resignation has unfortunately been brought about by failing health. In addition to the position he has thus taken up, Mr. Martin-Holland is a Director of Martin's Bank, Ltd., the London and South-Western Railway Company, and the Alliance Assurance Company.

Lance-Corporal S. Bradbury, of the 6th North Staffordshire Regiment, who prior to enlisting in the Army on the outbreak of war was in the employ of the Burton-on-Trent Gas Department, has been awarded the Military Medal for great bravery and devotion to duty. The official report states that in operations to the south-west of Lens on June 28 and 29, Lance-Corporal Bradbury was in charge of carrying parties. He repeatedly took up his parties under heavy shell fire, and by his cheery example urged his men on and got forward supplies of bombs and ammunition to the front trenches, where they were urgently needed. He was recommended for immediate reward.

As stated on another page, Mr. Samuel Glover, the Gas Engineer at St. Helens, after forty-five years' service with the Corporation, is approaching the date when he will be entitled to retire on a superannuation allowance. He is, however, as his friends would expect of him, anxious to do what is at this difficult time best in the interests of the undertaking; and the Gas Committee have recommended the Parliamentary Committee to take advantage of what a local paper describes as his most handsome and generous offer to remain at his post until calmer days arrive, though it is open to him to retire on over £500 a year. "This," remarks the paper referred to, "shows what an advantage it is to a Corporation to have local officials. Mr. Glover is a native—a St. Helens lad—of whom we can be proud. Without trying to upset everybody, he has worked a complete revolution in the gas-works, even during the last ten years—not to mention the change

compared with the position of the works forty years ago—and he intends to stick to it, to continue in his office, because he is a St. Helens man, and not in the town altogether for what he can make out of it." Mr. Glover has been Engineer and General Manager of the Gas and Lighting Departments of the Corporation for the last thirty years.

There were 36 applications for the position of Engineer and Manager of the Airdrie Corporation Gas-Works, rendered vacant by the resignation of Mr. J. W. M'Lusky on his appointment to Blackburn. A short leet of seven was drawn up, and a Sub-Committee appointed to interview some of these candidates at their works. As the result, Mr. Archibald Kellock, at present Gas Engineer and Manager to the Pontefract Corporation, was unanimously selected by the Town Council on Monday of last week to be Mr. M'Lusky's successor. The Gas Committee also recommended that an honorarium of £50 should be granted to Mr. M'Lusky, in respect of extra duties in the successful carrying on of the undertaking during the past year; and this was agreed to by the Council.

As will be seen from our news columns this week, Mr. R. W. Edwards has been appointed Managing-Director of the Aldershot Gas, Water, and District Lighting Company as from the 8th inst. He fills the vacancy on the Board caused by the death of Mr. A. F. Wilson, who was for many years identified with the Company. Mr. Edwards is comparatively a young man (in the early forties), and has been the chief officer at Aldershot for nearly nineteen years, taking charge when the undertaking was quite a small one. Mr. Edwards has, with the Board, been identified with, and primarily responsible for, huge expansion. Three Acts of Parliament concerning the purchase of other companies, the extension of the gas and water works, large additions of virgin gas territory, as well as the adoption of electricity over a big section of the Company's area, have been secured during his tenure of office. The gas side has increased five times over. Mr. Edwards was born and educated at Wallasey, where he was identified with the gas undertaking, being with Mr. H. Ashton Hill for ten years and his successor, Mr. J. H. Crowther, for the remainder of his service there.

OBITUARY.

Second-Lieutenant George Williams Hastings, of the Cheshires (Lewis gun officer), who was killed in action on the 1st inst., was the only son of Mr. Charles W. Hastings, the Editor of the "Gas Engineers' Magazine." He was 35 years of age.

Mr. Herbert James Brocklebank, the Chief Statistician in the Gas Department at Manchester (in whose service he has, by the way, been for thirty-five years), has lost his son, Lieutenant B. V. Brocklebank, aged 25, who was killed while leading his company in an attack. Lieutenant Brocklebank enrolled in the Manchester Regiment on the outbreak of war, received a commission in the Coldstream Guards at the latter end of 1915, proceeded to France in June, 1916, and took part in the Somme offensive.

Demand for Toluol in the United States.

With the entry of the United States into the war, demands for trinitrotoluol have become insistent; and it was stated by Mr. W. H. Gartley at the recent special meeting of the American Gas Institute in New York that if there is to be any increase in the amount of trinitrotoluol made, it must come from the toluol produced by gas companies. Coke-oven plants now under consideration and building will, within from eight months to a year, increase the output of toluol to some 14,000,000 gallons a year; but at the present time, any increase above 10 or 11 million gallons must come from the gas manufactured by gas companies, with possibly some small additional amount to be obtained from natural gas by certain chemical processes. However, Mr. Gartley felt himself in a position to declare that there is every prospect that the needed further amounts of toluol will be forthcoming. To this end, he regards it as not unlikely that every gas company in cities of 75,000 inhabitants and over will have to give the matter immediate attention. Because of the high prices of labour and material at the present time, it is calculated that the cost of erecting the necessary recovery plants will be such that the companies will not get their money back within a year if toluol sells at $1·50 per gallon. The Government, in this case, he argues, should be willing to provide the money for the erection of these plants, or they should guarantee to the gas companies such a price for their toluol over such a period of time as will provide, with careful and economical working in the matter of toluol recovery, for amortization and incidental expenses. The capacity of the towns of 75,000 inhabitants and over, in the matter of pure toluol recovery, is calculated at 3½ million gallons a year; and in a town of the minimum size named, Mr. Gartley thinks it would be unsafe to say that the cost of plant for the recovery of toluol could be covered for less than $2 per gallon for a period of two years.

Japan is, says the Commercial Attaché at Yokohama, a large importer of all kinds of fertilizers, such as nitrate of soda and sulphate of ammonia. There are several considerable fertilizer and sulphuric acid factories in Japan; and superphosphates are manufactured for export.

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

Considerations of cost have led on the present occasion to a further curtailment of the already abbreviated annual report of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act. The fifty-third report of the series, covering the twelve months to last December, has been issued; and it does not contain the reports upon the several districts which have hitherto been included, and extracts from which have been reproduced from time to time in the "Journal." These district reports were, it may be remembered, in the interests of economy, very considerably curtailed last year. The report to the Secretary for Scotland is appended, as is customary.

In the period dealt with by the report, the number of registered works in England, Ireland, and Wales was 1393, in 66 of which the operations carried on brought them within the definition of alkali works. Compared with 1915, there was an increase of three in the number registered as alkali works, and an increase of eighteen in the number otherwise registered. There were also 167 works in Scotland registered under the Act, making an aggregate of 1560 for the United Kingdom. The number of separate processes of manufacture under inspection last year was 2253. This is an increase of 128 as compared with 1915. The processes in which there was a large increase were chiefly associated with the production of acids for high explosives manufacture, and a wide adoption in gas-works of plant for treating crude tar. There was an increase of 13 in the number of sulphate and muriate of ammonia works, and of 68 in the tar-works. The number of visits to works last year was 3938, and of tests made 3605.

No proceedings were entered into for the recovery of penalty for contravention of provisions of the Act due to unsatisfactory conduct of registrable operations; but in one case this forbearance was owing to the prevailing war conditions. In two instances registrable processes of manufacture were found in operation in unregistered works; but after full consideration it was decided in each case to accept back fees instead of taking proceedings to enforce the penalties incurred.

As bearing upon a paper noticed on another page of this week's issue, it may be mentioned that Mr. Curphey states that in the works in which sulphide ores of zinc were calcined, some further progress was made in the utilization of the sulphur; and "still more progress would have been made but for difficulties connected with the operation of mechanical calcining furnaces and the great scarcity of suitable labour for working the special forms of hand furnaces required for such ores. One unit of sulphuric acid chamber plant awaited the effective operation of the mechanical furnaces designed to supply the necessary sulphurous gases. Various furnaces are in course of construction for dealing with further quantities of these ores, so that experience in their efficiency will soon begin to accumulate. It should then become no difficult matter for sulphuric acid makers to change from the use of iron pyrites to zinc sulphide ores for operating their acid plants, if supplies of such material become freely available." Mechanical furnaces for roasting pyrites and spent oxides were brought into more extended use. The demand for large quantities of sulphuric acid of the highest strength led to a great and widely distributed increase in the operation of contact plants. "The more general practical familiarity with the various designs of plant of this type will," remarks Mr. Curphey, "doubtless lead to a closer consideration of the comparative advantages of manufacture by this and by the chamber process for producing acid of different strengths, which may result in a permanent and more general adoption of catalytic methods than has hitherto been the case."

The reduced available supply of sulphuric acid was met, to a limited extent, by the utilization of nitre cake, which, under present circumstances, is produced in considerable quantities in certain localities. In one district, "material satisfactory in physical qualities, and testing 17 p.ct. soluble has been made;" while in another "economy in the use of sulphuric acid has resulted in some works making serious efforts to utilize a mixed nitre cake and vitriol solution as the dissolving agent. A useful superphosphate having about 20 p.ct. soluble phosphate has been produced in this way."

The number of works in the sulphate and muriate of ammonia and gas liquor group continued to increase; and during the year 722 processes were under inspection, which was an increase of 36 over the total for 1915. This increase, it is pointed out, arose partly from the registration of new works, and partly from the introduction of the manufacture of concentrated ammoniacal liquor in works where previously only sulphate of ammonia was made. It is regarded as probable that there will be a further expansion in the quantity of concentrated ammoniacal liquor produced. The use of a cheap oil, crude tar, or the like, so long a general thing in Scotland, for facilitating the removal of the metallic sulphides precipitated in the saturator when crude pyrites acid is employed for the production of sulphate from gas liquor, is now practised to a limited extent in England. "By this means," the report states, "the production of a white high-grade salt with the low-priced unpurified acid is facilitated through agglomerative effect of the oily material floating the impurities to the surface of the liquid in the saturator, whence they are easily removed by simple means, while the crystals of sulphate collect at the bottom for removal in the ordinary way." Particulars of the amount of ammonia recovered in the United Kingdom, and of the tar-works

in operation, will be found in the news columns of this issue [see p. 288]. With regard to the tar-works, the number registered was 316, as compared with 248 in 1915; the large increase thus shown being almost entirely due to the rapid extension of the use of tar dehydrating plants in gas-works. It will be noted that Mr. Curphey utters a warning with reference to the loss of benzol and toluol arising from the non-provision of sufficient condensing power with plants designed upon the continuous system—a method which has been very widely adopted. He adds that, while it may be to the interest of individual gas-works proprietors to provide small tar dehydrating plants, it is of doubtful advantage to the community to have numerous small units for treating tar put into operation without the specially skilled supervision, or care in design, necessary to ensure the plants being worked to their full advantage.

The report to the Secretary for Scotland shows that the number of works registered was 167, or three fewer than in 1915. Here, again, plans are in progress for the conversion of several large sulphate of ammonia units to the production of concentrated ammoniacal liquor. Some of the figures relating to Scotland will be found on another page with the others already referred to.

The bulk of Mr. Curphey's report on the present occasion consists of the results of a further study [the work was commenced in 1915] of the "direct" process for sulphate making in gas-works. This section is of such interest to "Journal" readers as to call for reproduction in our pages; and accordingly the first part of what he has to say is given on p. 281 of this issue, to be followed in later numbers by the remainder.

LIMITATION OF GAS SUPPLY IN GERMANY.

At Most 80 p.ct. of the Previous Year's Consumption.

One of the London papers last week stated that the gas supply in Germany was going to be reduced "to one-fifth" of the quantity used last year. If it had been stated "by one-fifth" it would have been correct, as the following translations—kindly supplied by an esteemed correspondent—of articles in the "Vossische Zeitung" of the 31st ult. indicate.

FROM THE "VOSSICHE ZEITUNG" OF JULY 31.

The Government Commissioner for Electricity and Gas (Prof. W. Kübler) has issued, under date of the 26th inst., a lengthy ordinance in order to secure the undisturbed operation of the gas-works. By this, one or more confidential officers will be appointed by the competent War Office authorities to every gas-works according to size.

New house connections, new main-laying, and the installation of bath gas-heaters and ordinary heating stoves are forbidden.

In extraordinarily pressing cases, and in installations up to 100-light meters, the confidential officer appointed to the gas works is authorized, under reservation of the right of revocation, to allow exceptions so long as the capacity of the gas-works is not thereby prejudiced.

In the case of connections which do not come within the four corners of this authorization, special permission is necessary, and application must be made to the competent War Office authorities.

The extent of the limitation of the total gas supply will be fixed for the time being by the Government Commissioner. For each individual works it will be computed on a uniform technical basis. The public lighting is to be kept down to its utmost limits.

The confidential officers are empowered to prohibit the use of ordinary gas heating stoves.

The sale of gas shall until further notice be so regulated that consumers who have used gas the previous year shall from now—month by month or in the usual period between meter readings—obtain a total of not more than 80 p.ct. of their past year's consumption.

If since last year the calorific power of the gas has altered in a demonstrable manner, then the 80 p.ct. limitation will be decreased or increased in like proportion.

The limitation applies equally to war work.

Conditions of exception may in general only be granted subject to revocation for the fulfilment of immediate war requirements, for communal kitchens, hospitals, railways, and water-works, and then first of all only to the 1st of October of this year.

The use of gas in excess of the quantity for the month allowed to the consumers is to be prevented in the most rigorous manner.

In the case of excessive use, the consumer will have to pay to the gas-works a surcharge of 50 pfg. per cubic metre [14s. 2d. per 1000 c.ft.]. In special cases this surcharge may be increased.

FROM THE EVENING EDITION OF THE "VOSSISCHE ZEITUNG" OF JULY 31.

The managers of the gas-works of Greater Berlin have already readily accepted the decree of the Government Commissioner for gas and electricity, published in this morning's issue, and have drawn up the conditions which will apply to their districts.

The Government Commissioner, who will give the responsible gas engineer every facility to take local circumstances into account, has raised no objection to these conditions; but they will require the consent of the Town Council before they are published and come into force, which may be before the end of this week.

The decree of the Government Commissioner was necessary in order to limit the use of coal, and to insure the production of gas for some time to come.

The managers of Greater Berlin's gas-works were of opinion that all must exert themselves as much as possible to meet the difficulties. Of course, they have no desire whatever to make the supply of gas difficult for long duration.

In consequence of the absence of oversea petroleum, a large number (especially of small households) have taken to the use of gas; and it is clearly in the interest of the producers of gas—indeed, in the interest of the State, to whom it cannot be a matter of indifference if we have in future to spend several millions on American petroleum—not to scare away these new consumers of gas.

The gas consumers would, therefore, do well to apply in all doubtful cases to the gas-works, who assuredly will not without necessity do anything to harm their consumers or create needless difficulties for them. On the contrary, they will consider it their principal duty to act as mediator without making the community and the interests of individuals suffer.

That a speedy intervention is necessary, is shown by the arbitrary stoppage of central hot-water supplies which have caused the gas consumption, already seriously high, to jump up by about 50 p.ct.

ELECTRICITY SUPPLY MEMORANDA.

Whether it is due to shortage of paper or to anything else, we cannot say; but two of our electrical contemporaries considered that about a column report of Mr. Justice Astbury's judgment in the Hackney case was [*ante*, pp. 183, 198] quite sufficient, a third was content with about half a column, and a fourth made a rapid flight over some of the points in the long argument of his Lordship, and managed to drop here and there a little harmless comment. If any electrical engineers want a verbatim report of the judgment, merely decapitated by the exclusion of the re-statement of the nature of the case, they will find it in the "Gas Journal." The "Electrical Review" has not had a comment at all on the case; the "Electrician" contented itself with a passing reference; and the "Electrical Times" appears to be shocked over the fact that a comment on the judgment appeared in our columns—"whether an appeal be pending or not." How remarkable! It is as remarkable as the reticence of our electrical contemporaries to seriously comment on the action. The case so far as the Chancery Court is concerned is finished. There is no appeal pending; all that has happened is that Mr. Justice Astbury has allowed three months within which to give notice of appeal. Until notice has been lodged, an appeal cannot be "pending." However, the "Electrical Times" escapes an awkward job by making the comment that "the little fallacies and weaknesses" of our comment "are buried only skin deep." We are pleased to find that such fallacies and weaknesses as there may be are, in the opinion of so competent and disinterested a judge as "Meteor," "little" ones. An ancient journalistic device is that adopted by "Meteor" to escape from doing something the "fallacies and weaknesses" in which would probably be entitled to a descriptive term stronger than "little." He refuses to specify the fallacies and weaknesses, and to finally bayonet them with right good will. He merely adds (still referring to our comment): "We consider it a more hopeful contribution to our cause than any pleading which the limits of discretion would allow us to set forth at the present juncture." And thus one has disclosed a confession of hopeless inability to do anything satisfactory to destroy the criticism, lest what was done only went to confirm that current used for lighting at the time of peak load, charged at power rates, is giving undue preference as against lighting consumers whose consumption for a corresponding lighting supply may be similar in all respects. "Meteor" knows as well as anyone that lighting consumption (unless it be for some special purpose during daylight hours) cannot, without offence to the principles on which electrical tariffs are based, be brought into the same category as power consumption.

Hackneyed Evasion.

Off-Peak Loads.

"Electrical Industries" calls attention to the fact that Mr. Justice Astbury asked: "Why could not the undertaking give a better rate to the man who took a larger quantity than to one who took a smaller quantity?" We are obliged to our contemporary for giving prominence to this question. It shows that his Lordship did not realize the importance of the time factor—that the power consumer who wants his energy all in a lump (say, in an hour or two) is not as profitable a consumer as the power user who takes the same quantity, and even somewhat less quantity, of energy spread over several hours of the day; and that the power consumer who at peak-load time piles-up units for lighting purposes on the top of his power consumption, and only pays power prices for the lighting units, is a consumer whose consumption during those hours it would be better for the undertaking to dispense with. Just about the time that Mr. Justice Astbury was delivering his judgment, the "Electrical Review" was appropriately writing an article on "Off-Peak Loads." It should write one now on "The Sanity of Supplying Current at Peak Time at Off-Peak Rates." Let us quote two or three sentences. "So great and so manifest are the advantages of off-peak loads to electricity supply undertakings that it is a matter for surprise that they have not been more assiduously sought and cultivated in the past." After referring to certain new applications of electricity, our contemporary remarks: These "are particularly welcome to station managers, as they can be arranged to fall entirely within the off-peak period, and thus enable the supplier to improve his load." It also urges in relation to new off-peak load business the importance of due preparation in three particulars, one of which is; "The provision of suitable tariffs for guaranteed off-peak

loads, easy to understand, and attractive by virtue of their cheapness." Is the Hackney 20 p.ct. of power consumption which may be used for lighting an "off-peak" load which can be justifiably supplied at power rates? Concerning the off-peak loads that the "Review" urges should be cultivated, would it advocate that a condition to be applied to them should be that a quantity of current equal to 20 p.ct. (which would come upon the peak load) should be supplied for lighting at off-peak rates? If not, why not, in view of Mr. Justice Astbury's judgment? "Electrical Industries" thinks that the Gas Light and Coke Company is up-against the awkward fact that the exact principle of the Hackney tariff is legalized by Act of Parliament in the case of the power companies. It would be interesting if our contemporary would inform its readers why the "principle" has not been expressly legalized in the case of undertakings other than power companies. The point was discussed more extensively a fortuight ago [p. 184].

Please Don't.

The "Electrical Times" and "Electrical Industries" are both persuaded that the case is going to appeal; but the latter paper would rather have an appeal deferred, and the uncertainty of the position continued. We shall be astonished if the matter does not go to the Appeal Court. But the omniscient first-named paper asserts: "The whole matter, we believe, is going to appeal." What is the ground of this belief of our contemporary we do not know, unless it be that it would not itself (if in the position of the Gas Light and Coke Company) allow such a judgment as that of Mr. Justice Astbury to stand without making some attempt to upset it. But "Electrical Industries" goes even further. It says that "the Gas Light and Coke Company is prepared to carry the case to the House of Lords in the hope that some legal reinterpretation of the 'undue preference' clause will embarrass a competitor who has got the better of gas in the power and lighting fields." Why, then, the anxiety of the competitor to differentiate in price between the power-lighting consumer and the non-power lighting consumer, whose lighting circumstances are similar? The Gas Light and Coke Company will be interested in this preknowledge by our contemporary of its intentions, as well as over the anger at the waste of men's brains and time in discussing such a case during war time, although it does not hesitate to devote the best part of the first three columns to the matter in its Aug. 1 issue. "Under war conditions," it says, "we really ought to be spared the spectacle of engineers who are busy men, and lawyers who ought to be busy [Mr. Walter, K.C., for the defendants, is by the way, the representative of the Ministry of Munitions on the Electric Supply Committee] wasting hours over debating platitudes in a case which arises out of commercial jealousy, and might readily wait until after the war. Presumably, it is no use appealing to the Gas Light and Coke Company to let the matter stand over; the Company is more or less committed by the gas associations behind it." The case does not arise out of commercial jealousy, but out of commercial fairness. We ask our contemporary if it will be so good as to be a little more explicit over the words: "The Company is more or less committed by the gas associations behind it." We challenge our contemporary to put into plain words and to publish what it manifestly intends shall be inferred from the statement.

Preparing for the Inquiry.

Sir Albert Stanley, the President of the Board of Trade, having made a firm resolve not to give way any further to the agitators who desire to supplement the membership of his Electric Power Supply Committee, or to wreck it altogether and to set up a new body, the various organizations who have been invited to tender evidence are turning their attention to preparing for the inquiry. The London County Council are going to allow their Comptroller to give evidence; but strictly upon the understanding that the Council are not in any way committed in the matter of their policy by the discussion before the Committee. They are also permitting a private and confidential report prepared by the Comptroller, the Chief Engineer, and Mr. C. H. Merz (one of the members of the Committee), dated July 14, 1914, relating to a legislative proposal, to be placed before the Committee. The Association of Municipal Corporations have nominated three witnesses from Leeds, Blackburn, and Sutton Coldfield to give evidence; and they have circularized other local authorities, asking for observations on matters which it would be useful for the witnesses to have. The Association give an indication of what they consider will be, among others, questions that will come under discussion. They believe that consideration will be given to the idea of forming entirely new and large areas of supply and distribution, irrespective of any existing municipal boundaries, as well as to the constitution of the managing body to deal with the supply of the large areas. This, of course, is a development for which the municipal authorities are not anxious, as, generally speaking, they would rather retain possession of both supply and distribution within their own areas. There are some people who think the Association of Municipal Corporations should be linked-up with the Incorporated Municipal Electrical Association in the matter of policy to be adopted in the case to be submitted to the Committee. A contributed article in the "Electrical Times" seems to indicate that the latter Association wants a little energizing in the matter of a policy. The report that has been circulated by the Association of Municipal Associations is regarded as a pretty non-technical piece of composition which may have effect with town councillors and members of Parliament. The Urban District Councils Association have appointed a Sub-Committee to consider the evidence to be furnished on their behalf; and the Executive Council have enunciated certain principles upon which the evidence should proceed. These are as follows: (1) That the future electricity supply of the country must be looked at from a national and not from a parochial point of view; the first consideration being a supply of cheap electricity. (2) That it is essential that any scheme for the construction of large stations should secure a satisfactory supply of energy in bulk on fair terms to any local authority authorized to supply and desiring the same. (3) That the profit of any bulk supply undertaking ought to enure for the benefit of the community. (4) That if any existing undertakings are taken over, they should be acquired on equitable terms. If the matter is to be considered from the national and not from the parochial standpoint, then, among other things, there ought to be no profit from bulk or any other supply to go in relief of the rates. Any way, it ought to be a *sine quâ non* of any new scheme that the charges should be such that no part of the costs of supplying consumers should fall upon people who do not require electrical energy. Legalized robbery should be ended once and for all. Municipal electrical engineers had better look promptly after their own positions, or they may find the representative local authority organizations will be advocating before the Committee just the line of policy which will reduce the professional and market value of the central station engineer, and confirm the well-known views of one member of the Committee as to the value of super-stations under super-men.

Municipal Wiring.

The "Electrical World" has lately been ascertaining the views of electric supply authorities in the United States regarding the vexed question of the wiring of houses and other premises by them or by contractors. There are not many municipal electricity supply authorities in the States; and they are under no necessity to get powers to do this work—being perfectly free to decide the matter for themselves. If the local authorities on this side were in like case, they would make short work of the businesses of the local contractors. The "Electrician" has commented on the subject. Speaking of the conditions ruling in America, it says: "Where local contractors are unwilling to do this work in a manner which will help to build-up the central station load, the engineer can start a wiring department, and get busy with both domestic and industrial installations. In such circumstances, an installation department can often be carried on quite profitably, and the action of the engineer in establishing it is fully justified." Upon this it may be remarked that profit can only be made when sufficient prices are charged; and an unfortunate characteristic of municipal electric trading in this country has been that there has not always been care to charge paying prices, with the result that the ratepayers have had to bear the burden, and a jocular dispensation has arranged that one of the largest—frequently the largest—ratepayer shall be the chief competitor of the non-paying electricity concern. It may be a good joke, but nothing more monstrous has ever been permitted. If it were the other way about—if large sums of money were habitually being lost by municipal gas undertakings, and electric supply companies had to pay a larger part than any other individual ratepayer, we should soon be having ponderous comments from one quarter, yelpings from another, a courteous and perhaps a dispassionate protest from another, and an attempt at a scathing indictment of an iniquitous system from yet another. However, the "Electrician" also observes: "So far as this country is concerned, it seems to us that the matter is one in which the local conditions should be the governing factor. It is the experience of a large number of British central station engineers that, *if* the local electrical contractors are indifferent to development, then the supplying authority should itself endeavour to carry on the business of wiring and installation work. We think that even the Electrical Contractors' Association would not object to this course being taken." With wiring powers as a general possession, there would be no "ifs" in the matter of decision. Departments would wire, and contractors could go to the Bankruptcy Court for all some electricity departments would care. Our contemporary in its remark concerning the Electrical Contractors' Association shows great faith in the yielding and altruistic traits of that body. We have failed to observe them.

One National Gas Association for America.—The "Gas Age" states that complete plans for the organization of the American Gas Association, which will unite the American Gas Institute and the National Commercial Gas Association, and perform all the functions hitherto exercised by both, have been worked out by the Sub-Committee appointed for this purpose, at a joint meeting of the respective Public Relation Committees in February last. A report will shortly be made at a second joint meeting, when it is expected that the plans will be approved, and recommended for adoption by the Boards of Directors. They embrace full provision for making the new Association thoroughly democratic in every particular, and that all interests concerned shall have equal rights and privileges. The articles of association, constitution, and bye-laws will not be made public until finally approved and adopted by the Joint Committee. The Natural Gas Association of America is not included in the unification plan.

IRISH ASSOCIATION OF GAS MANAGERS.

Presidential Address of A. S. Brook, of Lisburn.

[Read Tuesday, Aug. 14.]

We are meeting under very difficult and trying times by reason of the world-wide clash of arms, in which the men of the gas industry are playing no small part in trying to bring the war to a successful conclusion; and the termination of our labours in this direction will be welcomed only if satisfactorily accomplished. We in Ireland cannot, perhaps, claim to have accomplished all that our *confrères* across the Channel have done in the supply of articles so desirable for the furtherance of the war—such, for instance, as toluol, for high explosives; but any omission in this direction is not primarily to be laid at our door. In my own case, the tar produced has, for the past thirty years, been sold to felt-works, and, with a few exceptions, very small quantities reach the tar distillers. Many works inland have been fortunate in creating a local demand; and after reading of the experience of those who have the "C" process in operation, and the unreasonable attitude of the gas consumers, those who have not carried out the process have escaped something in the way of adverse criticism.

EFFECT OF WAR ON THE GAS INDUSTRY IN IRELAND.

It may be desirable to place on record, in a small way, the effect of the war on the gas industry in Ireland. In the first winter after the outbreak of hostilities many of us in the North had great difficulty in obtaining labour to replace the men who had volunteered for active service. Our next trouble was the deficiency in coal supplies. In my own works, up to the present there has been no more worrying time than in the winter of 1914-15. It may, perhaps, be necessary to say here that all gas-works in Ireland are dependent on eight classes of labour to obtain their supplies; and with all these classes, dislocation, with consequent delay, has been met with during the past few years. To many of you, who have never known it otherwise, this aspect of the matter may not appeal as it does to me, and I spent a good many years at works which were supplied, from pithead to inside the retort-house, by carts using the King's highway.

It is self-explanatory that, owing to the upheaval in the labour world, we in Ireland should have had a most trying time in the delivery of our raw material. Naturally, this added on to the cost of coal, and the prices in our various works have been more than doubled under this head. Freights have also played a very important part—in my own case quadrupled; and in the West of Ireland, I am informed that six times the pre-war rate has been paid. The Coal Prices Limitation Act was a complete failure, as, so far as my experience is any guide, any one applying it to their contracts received no offers. In my case, contractors who had supplied for years refused to tender for our requirements.

During the past year, the demand for coal has been fairly well met. At the time of writing, the Coal Controller is developing a large scheme for the effective distribution of the available coal, with the view to saving mileage of railway engines and trucks; and although some of us may not get what we consider a good and efficient substitute for our usual supplies, we will not unnecessarily place anything in the way of the furtherance of the war to a speedy end. The advantage of having large storage accommodation has been especially marked; and in some instances large expenditure has been entailed in providing for abnormal requirements in this direction.

Increase in the price of gas has been inevitable, and in the majority of cases has been modestly applied. With a decreased income from residuals, a great number of works are losing money; while every one is straining every nerve to meet the additional demands made upon them financially, mentally, and physically. The action of the Government in fixing the selling prices for sulphate of ammonia demands notice after allowing the producers of sulphuric acid to increase their prices out of all proportion to pre-war prices.

The refusal of the Government to permit loans to be raised for the development of our industry has temporarily checked progress; and what was considered a stringent order has, by the efflux of time, proved beneficial. The dearness of money, by reason of the large demands for the purposes of the war, will have the effect of retarding progress for a considerable number of years after the cessation of the struggle; and it is questionable if for the next generation, if ever at all, we shall enjoy the low level of prices that obtained in pre-war days. The increased cost of living has been a card played with great effect by manual workers in our industry. As yet, one can glean little information of any benefit accruing to those in charge of the various undertakings, either in Ireland or across the Irish Sea. It was suggested a little while since that the time was ripe for a free and full discussion on the question of salaries during these abnormal times; but none of us have had the courage to try and secure for ourselves some recognition in this desirable direction. I have no doubt that many have thought of these things, and considered ways and means of achieving the end in view. The National Union of Teachers, as you have seen, have solved the problem in part—and without any loss of dignity either to themselves or to their profession.

My advent into Ireland was to a works which only a short time previously had been transferred from a private Company; the usual course of compulsory purchase and its expensive formula having been gone through. A Past-President of our Association had reason to call attention to a remark made by an expert witness, in connection with the Lisburn Gas-Works purchase—namely, "That Irish gas-works were not well managed." This statement was calculated to reflect on the managers in charge, rather than the owners; but in the particular case referred to it was the owners who were at fault. In investigating accounts and the management of some works in Ireland, and claiming to know something of the managers of Ireland, the Directors in the case referred to were lacking in enterprise. During the past few years, many undertakings have removed the stigma of want of enterprise, so much so that it is doubtful if those responsible have not allowed the swing of the pendulum to carry them to excess in this direction at some of the smaller works in our midst. With very rare exceptions, there are few gas undertakings that can afford to experiment in any way. I have never had the good fortune to control a works where there was any surplus cash available to experiment with; and as a word to the wise is sufficient, to the majority of our members very careful thought is necessary before departing from recognized practice.

PUBLIC AND PRIVATE OWNERSHIP OF GAS-WORKS.

The question of public or private ownership of gas-works has, in the past, exercised a certain amount of discussion; and I have thought it might be of some service to further ventilate this important matter in my address. I hope, however, that anything I say will not be regarded as egotism on my part; one cannot help introducing personal matters when dealing with a topic of this kind. I may claim to have had rather exceptional experience in having served in three works which changed hands from private to public ownership—Ossett, Chard, and Lisburn; and I had the development of two of these undertakings entrusted to me.

In theory, the public have a very good case for the control of gas-works, because every gas-works is dependent upon the use of the public roads for the means of conveying their product to the consumers; and as those who are working without an Act of Parliament are subject to the control of the local authority, this has caused certain people to assume that they have some pecuniary interest in their gas-works. Among the causes which usually operate during the agitation preceding purchase are jealousy of the successful carrying on of a particular works, and, in the past, a want of business acumen on the part of the owners to meet the public needs. Many instances could be quoted of boards of directors refusing requests of local authorities for supplies to, perhaps (for the time being), an unprofitable district—forgetting that most towns are progressive, and that eventually the district would be more rapidly developed by having the advantage of a gas supply, which would eventually prove profitable to the company. Many purchases have been brought about by the company and the local authority having misunderstandings, and deadlock ensuing.

In one town I found that the works were eventually purchased because the company were trying to rush through an application for an Act of Parliament to raise new capital and the adoption of the sliding-scale; local notice being given at the very last moment, with barely time for the council to take action. I found that of the members of this council there was only one who really believed in public ownership. In the other two cases of which I came into personal contact, the companies were not carrying on the business in a progressive spirit; and they deserved the fate which eventually overtook them. They rested on their laurels, and were satisfied with dividends only—a thing not to be despised; but it should not be the beginning and end of everything.

The necessity for public ownership is steadily becoming extinct by reason of the progressive attitude adopted voluntarily (and in some cases of necessity) by gas companies consequent upon the competition in other forms of illuminants. The security of the business is not, one is happy to say, so fixed as it was when the speaker first took up duties at a gas-works. I say happily because any engineer or manager can now readily have the ear of any board if he can show a reasonable cheapening of the cost of production. As a fact, I know of a case where a gas company had as their sole adviser, for a scheme to double its capital, a manager who could not ascertain the possible effect on the balance-sheet. Need I add the sequel—disaster for the manager. I mention this case as a warning. To quote an old and familiar saying, "Two heads are better than one," and will have the result of taking heavy responsibility off one's shoulders. The engineer or manager in charge is not in the happy position of the consultant of being here to-day and gone to-morrow. You and I have to meet each and every day the persons in authority; and woe betide the man who fails in any one point, especially if it is something that can be readily assimilated by the lay mind.

The progress in reducing manufacturing costs that has been made of late years, coupled with the attention given to consumers, and the changed attitude betwixt the supplier and the consumer, is all to the good. As Britain was termed "a nation of shopkeepers," so may the gas industry now likewise be designated. I will venture the opinion that there is no advantage to be obtained now-a-days for the community by the purchase of a progressively managed gas-works unless it can be arranged privately. One has lately been transferred—Lurgan—avoiding the law costs, which probably would have amounted to £7000.

Compulsory purchase costs in the following cases were: Chard, £6896; Lisburn, £5755. Cost of the Act of Parliament: Chard, £1141; Lisburn, £1556. From the engineer's standpoint the compulsory purchase costs is all money wasted; and I have

thought how nice it would have been to have had this money put to some profitable outlay on the works or distributive system. The interest, taken at only 4 p.ct., amounts to £276 and £230 respectively; and sinking fund charges, £207 and £172, equal to a charge on the price of gas of 5·79d. in the case of Chard and 2·83d. in the case of Lisburn, and are chargeable for thirty to forty years respectively. It will be noticed that costs are much the same, irrespective of the value or size of the works.

One sometimes hears disparaging remarks about council management which do not appear justified by results, and for members of our Association to encourage such statements does good neither to themselves nor any of their colleagues. This equally applies to comparisons among privately-owned concerns. This leads one to offer a word of counsel to our members in pitting one's work against another. Works vary so considerably that it is folly for a man with an up-to-date plant to make comparisons with one who has, perhaps not from any want of forethought, what may be termed an "obsolete plant." And I am here reminded of a saying made to me by an elderly gas engineer, "that he had long since learnt that what was suitable for one works was not suitable for another, and that those in charge must decide." I would also plead for the members of the Association a spirit of true comradeship—not to allow any one of our members to be disparaged with impunity without just cause.

I am desirous of seeing the Association more active on the commercial side of our business life; and Mr. J. T. Reid has consented to introduce the matter to you to-day. It is a subject worthy of the support of everyone, and is not a new thing on the other side of the Channel, and, I may add, was the making of an Association of which I was the founder and Hon. Secretary, which latter office I held until removing to Ireland.

THE FUTURE OF THE GAS INDUSTRY.

What has the future in store for the gas industry? He would be a bold man who ventured to hazard the place it will occupy in years to come. One thing this war has shown is that the gas supply, which is looked down upon in some quarters by reason of its old age, is essential to the quick and reliable turning out of munitions of war; and in the industrial life of our Nation it is, I am convinced, destined to fill a valuable position for indefinite years to come. To paraphrase Longfellow:

> The heights by gas men reached and kept
> Were not attained by sudden flight,
> But they while their detractors slept,
> Were toiling onwards through the night.

Some of us have had practical experience of the sentiments expressed in the last lines; and I have known some people who despised what is usually called the "dirty side of gas making," but who have now, by removing the dirt from their own eyes, got a clearer vision of the usefulness of the industry we represent.

DEVELOPMENT OF THE LISBURN GAS-WORKS AFTER PURCHASE BY THE COUNCIL.

The Lisburn Council purchased the gas-works on Dec. 1, 1910, succeeding to a concern which was totally inadequate to supply the needs of the community, with the result that before the Council had long been the owners disaster overtook them in their inability to supply gas on several occasions, which earned for the Council a reputation not to be desired by any body of men who give their services to the community. I should like to state here that the members of the Council did not deserve to be branded with incapacity. The Council paid £33,000 for the undertaking. The cost of the Act and the arbitration was £7300; making a total of £40,300. [The capital of the Gas Company was £12,000.] It has been my experience that when a Council purchase works, and have read all the evidence of witnesses who have appeared for the Company, they naturally think they have got something for their money. In this particular case, it was more apparent than real. The manufacturing plant was obsolete, and had given great anxiety and trouble for a great number of years. The Council were urgently recommended by their then manager to rebuild the works with a view to economy of production. After twelve months had elapsed, they adopted a scheme submitted by two outside engineers. Owing to the restricted site, the consequent slow process of reconstruction, and the railway strike happening during this period, the new works were not put into operation until June, 1913. During the reconstruction period, so much trouble fell upon the Council that three managers had taken a part in the completion of the works. At one period (December, 1912), when the writer took up his duties, it was considered an impossibility to get through the period during the heaviest output of the year. The old carbonizing plant had been allowed, in anticipation of the new plant coming into operation, to become practically unworkable, and caused grave anxiety as to the possibility of the retort-benches collapsing. The results were exceptionally bad—on the worst days not more than 4500 c.ft. of gas being obtained from a ton of coal.

In 1912 the coal used was 5612 tons, and produced 46,038,000 c.ft. of gas—an average of 8194 c.ft. per ton of coal carbonized. What a glorious opportunity, someone may think, to improve results! Quite so. But to make the undertaking a financial success, there was much to be done to arrive at the desired haven. Capital charges were mounting up quickly. Sinking fund and interest had to be met, before the full effects of the new works were in operation. Our first full year under the new plant was in 1914. By that time the capital had increased by £16,435, and interest and sinking fund had risen to £3258 for one year's charges. At this juncture I recommended that we should adopt the prepayment installation system; and the benefit to the undertaking was great by the increased sale of gas up to the year ending 1916. The Treasury, in 1915, restricted all councils from raising loans; and thus put a stop to our forward policy. Since then we have been resting, and concerned with merely administrative duties.

In conclusion, I wish to record my appreciation of our Hon. Secretary and Treasurer and the members of the Committee during my term of office. It has been a real pleasure to work with them. To you, who have attended here to-day, I owe my thanks.

GAS AND WATER WORKS IN WAR TIME.

THROUGH GERMAN EYES.

[Presidential Address at the Annual Meeting of the German Association of Gas and Water Engineers, on June 22.]

Gas Supply.

Passing on [see *ante*, p. 233] to gas-works, the influence of the war on which was the topic of Herr Hase's Presidential Address in 1916*, the gratifying picture then drawn of the flourishing condition of the gas industry in Germany has not changed, or at least the change is only apparent. The tree to which the industry was then likened still stands before us in exuberant vigour, merely tried and hardened by the bad weather which rages round it in these difficult times. It is not to be denied that during the past year we have suffered disillusionments; that many twigs on the tree of the gas industry have been severed; and many works' managers look back with secret horror on the times they have passed through. But, on the other hand, it must be remembered that there is nothing inherently permanent in these things, which are merely episodes that cannot upset the true foundations of great development. Already the necessities of war have engendered new forces and new values, and we know that after the war a fresh period of expansion will dawn on the industry. Blessings will spring from the necessity and privations of a great time.

Coal Supply.

Foremost in interest stands the question of coal supply. A bitter feeling has stolen over many of us as we have found it difficult to secure the necessary quantity and quality of the raw material on which we depend in order to fulfil the requirements for gas of all classes of the population and all industries. Our efforts to help the country and the community in this essential matter are being frustrated. This undesirable state of affairs has not been brought about by neglect on the part of the Government organizations or the colliery managements, all of which have done their duty. But circumstances have been stronger than men; for in war political considerations and imperative military requirements take precedence over home needs. Consequently, it has, alas, come to the point that certain gas-works have had to restrict, or even to suspend, operations. The Federal Council, the Military Governors, and the Local Authorities have given the order "Save gas," which a year ago was almost inconceivable. The progress of gas-works has been held up, and the beautiful promises that the coal supply of these works was assured, have been smothered under the weight of facts. A bitter disillusionment, indeed!

The coal scarcity naturally is not confined to gas-works, but is general. It arose—until recently at any rate—not from shortage of coal at the pits, but principally in the transport difficulties. It became impossible, owing to want of wagons and locomotives, to get away the coal and convey it in due course to the places of consumption. This was partly due also to stoppages caused by congestion of the railway goods sidings and yards, which the best efforts could not clear quickly enough.

The German Association of Gas and Water Engineers and the other technical bodies did not remain passive in face of these developments. Early in November, when the prospect first got clouded, the Council and the Management of the Central Gas Bureau busied themselves with the impending coal crisis. The Association's Special Committee on the Working of Gas-Works met in the same month, and went on to consider the measures and proper steps to be taken in the event of restrictions of working becoming necessary. The Commercial Union of German Gas-Works also dealt with the coal question at district meetings. Representatives of over a hundred gas-works in Central Germany, at Leipsic on Dec. 6 last, sent a request to me to bring without delay to the notice of the Federal Government the threatened stoppage of gas-works, and the dangers to military requirements and industrial activity which would ensue therefrom, and at the same time to ask that proper measures should be taken to ensure without fail the supply of coal to gas-works. A factor which contributed to this step was the belief that the Coal Distribution Department of the War Office was not utilized to good purpose. Its measures might be serviceable in particular cases of urgency, but were not fitted to assist the general run of claimants to its services. The Coal Distribution Department is not allowed to play its part until there is serious trouble—then its aid frequently comes too late, and does not put an end to the troubles of works

* See "Journal," Vol. CXXXV., pp. 339, 436; Vol. CXXXVI., p. 223.

managements. The request of the Leipsic gathering, which was backed by the Association of Gas and Water Engineers of Saxony-Thuringia and by other District Associations, received the serious consideration of the Council, which ultimatety presented a petition to the Federal Government embodying its points. It is not possible to say whether this petition had any effect, or made any impression; but the fact remains that all the measures taken have not prevented an aggravation of the position.

A conference of the Council of the Association with the Councils of all the District Associations took place in Berlin on Jan. 6 last, and an exhaustive debate on questions of the day, and particularly the coal question, took place. It was generally admitted that the outlook had grown worse rather than better. The valuable services of Herr Lempelius, as the Association's representative in the matter, were fully recognized, as well as the difficulties which confronted the Coal Distribution Department. The Imperial Authorities may do everything possible; but this does not help the gas-works enough. It is essential, in the first place, that they should be guaranteed their least possible requirements of coal. Stores of coal should be accumulated in the summer, in order to relieve the coal delivering plant in the winter. The early negotiations and efforts have been repeated again and again right up to the present time. Conferences with the Coal Distribution Department have alternated with conferences with the coal dealers. The Imperial Commissioner of Coal Distribution has been repeatedly and exhaustively informed, both in writing and by word of mouth, as to the position of gas-works and their importance for agriculture and the common weal; he has been urged to give gas-works the relief and full supply they need in view of the fact that they afford the best and cheapest fuel supply to towns. The Association, as the chief representative of the German gas industry, has on all hands been requested to keep a watchful eye on the development of the coal question. It ought to be stated that the Council, in conjunction with the Councils of the District Associations and other technical bodies, has done all that lies in its power. Naturally, it cannot tilt at windmills, nor satisfy every wish expressed to it. It is impossible to please all, and we are living in a time when little depends on good will and almost everything on force of circumstances and accident.

The Council of the Association has met five times since the end of March with reference to the coal question, and has attended three conferences with the Imperial Coal Distribution Commissioner, as well as almost weekly conferences in Berlin on the matter. Finally, in agreement with the managements of the larger gas-works and the Presidents of the District Associations, it has transmitted to the Head of the War Office a petition of which the final paragraph runs as follows:

> "Having regard to the foregoing statements, and impelled by the grave and perilous position of the German gas-works, we humbly implore your Excellency to give orders for gas-works to be fully supplied with coal, so that they may be placed in an absolutely safe position in regard thereto; and we beg you to use every means at your command to effect this, and in particular that an immediate start may be made in replenishing the stocks of coal at gas-works."

A copy of this petition was also handed by me personally to the Imperial Coal Distribution Commissioner. At the present time the view is taken in influential quarters that it will be possible to give an almost full supply to gas-works. But no definite decision has been come to. Perhaps a clear pronouncement will be made at the conference which has been arranged with the Coal Commissioner this afternoon, June 22. ["*Perhaps!*"]

Restriction of Gas Consumption.

Apart from the faulty supply of coal, it is regarded as certain that the Federal Council has prepared special measures for curtailing and controlling the production and consumption of electricity and gas as well as of water. This strikes one the more painfully because it is in the interest of the community as well as of the conduct of the war that there should be no artificial restriction of gas consumption. It is opposed to what is desirable and necessary. Solid fuels are much inferior in heating effect to gas. Consequently, as much coal as possible should be distilled, and as little as may be used directly as fuel. The supply of gas coal for gas manufacture effects a great economy of railway transport. According to Herr Kobbert, of Königsberg, 15,000 tons of coal for gas making furnish as much heat (which is utilized) as 24,000 tons of house coal; while Herr Körting, of Berlin, puts the ratio at 10,000 tons of gas coal as the equivalent of 19,700 tons of house and steam coal. The coal-grate squanders most of the fuel; whereas gas-making returns about half of the fuel as coke, and gives a much better yield than coke-ovens of the bye-products of value for war purposes. The fact is that a limitation of gas consumption should be entertained only in respect of lighting, and then only for other than domestic lighting. Any limitation of industrial gas consumption is a beating of the waters, and affects almost solely military supplies, either directly or indirectly. It is the same with the use of gas for cooking and heating, especially for cooking the meals of town dwellers. Heat not supplied by gas means a greater draught on the supply of solid fuel, and so entails an increased burden on railway traffic in the ratio of 8 to 5 or 8 to 3 [*vide supra*].

Other transport conditions also would be unfavourably affected by a reduction in the supply of coal to gas-works, because the coal unloading and handling plant at these works is simpler and more economical in use than the means used to handle and deliver house coal. If it is true that gas-works are the best medium for local fuel supply, and that consequently the people have the liveliest interest in gas-works being adequately supplied with coal, everyone ought to join in paving the way for proper provision being made for it. If this proves impossible, the failure could be ascribed only to the insuperable difficulties caused by the course of the greatest war in the world's history. We must not, however, grow weary of proclaiming the foregoing facts again and again, and bringing them before the notice of influential quarters, in order that a complete return to satisfactory conditions may be effected at the earliest possible moment.

Better Utilization of Coal.

The problem of the better utilization of coal has been repeatedly dealt with in the Technical Press, irrespective of its bearing on the war. The proposals to call a halt to the prevailing waste of coal, to erect central heat and power stations, and to extend the use of gaseous fuel, have all come to the fore more or less because the industry of bye-product recovery in coke making has grown enormously, and its output (in Germany) greatly exceeds that of the gas industry. The development of the water-gas process has also had some influence. While these proposals in the first instance have perhaps merely a theoretical aspect, we ought nevertheless to put all our strength into efforts to get rid of direct firing with raw coal, and thus to reduce as much as possible the plague of smoke and soot. Gas and coke should be conjointly brought to the front as fuels. The object aimed at depends for its attainment very much on price, and will be more nearly achieved the better we are able to utilize our coal by more thorough recovery of bye-products, by better use of waste residuals on our works, and by the adoption of the most suitable plant. All gas plant works more economically than formerly, and everyone should ask himself whether it is not possible to improve further the return from the plant by better utilization of the waste heat from retort-settings, exhaust steam, buildings, machinery, conveyors, labour, &c. One of the most important problems of the age is the practical solution of the question of the competition of gas with raw coal.

Emergency Measures on the Works.

The unsatisfactory coal position must be met in two ways—viz.: (1) By measures taken on the works, and (2) by limitation of consumption. The omission of the Council of the Association to recommend and publish suitable measures, after investigating all likely proposals, is due to their recognition of the differences in local conditions, and to the fear that such action would be misinterpreted by the Imperial authorities. Experiences gained in Königsberg, Dessau, and Düsseldorf, among other places, have been given, however, by the managers of these works, and valuable hints thus afforded to their colleagues.

Works' measures for making the most of the coal include: Lowering the quality or calorific value of the gas by completely gasifying the coal—*i.e.*, making gas from the coke also; bringing into use, or utilizing more fully, water-gas plant; making larger quantities of water gas in vertical or other retorts by blowing steam through coke after it has been heated to complete incandescence; adding producer gas, flue gas, or air to the coal gas; and carbonizing other fuel as well as gas coal—*e.g.*, lignite, house coal, wood, &c.

Consumption may be checked by reducing the distributing pressure, by restricting public lighting, and by influencing the public to economize. In the latter direction run the decrees of the Federal Council, the orders of the acting military governors, and local prescriptions. Admonitions to the public to exercise economy are well known to have but little effect—more drastic steps are needed. Among the latter may be named: The prohibition of show window lighting; reduction of other shop lighting; introduction of earlier shop-closing hours; fixing of office and business hours; earlier closing of public houses; and the shutting up of places of public amusement. In urgent cases, consumers supplied at a fixed charge per burner—*i.e.*, not by meter—and large users must have their gas supply cut off, or the whole supply must be interrupted for certain hours every day. Specially effective are a large increase in the price of gas, with or without the fixing of a maximum consumption per quarter, and the threat of a withdrawal of the supply if a certain consumption is exceeded. Such measures, which touch the consumer's pocket, are really the most effective.

Restriction or interruption of working throws on the gas-works management the duty of instructing the public what to do; and the Press can here afford most valuable assistance. In the first place, in order to prevent explosive mixtures being produced, care must be taken that no vacuum occurs in the mains and apparatus. The gasholders must be filled enough to prevent unequal pressures in the distributing system, and, if this is impossible otherwise, consumers must be cut off.

Suggestions made need very critical examination in every case. For instance, the addition of water gas does not in itself signify a reduced coal consumption, as the gas is of lower heating value, and consequently more has to be used; while coke is withdrawn from the market when water gas is made. The addition of air, if made before the gas has passed through the purifiers, may conceivably result in overheating of the oxide and disastrous fires and damage. It is evident also that restrictions on consumption need very careful forethought, because the most drastic saving of gas

lighting could mean, at the most, an economy of 400,000 tons out of the 10 million tons of gas coal carbonized in German gas-works in the year, and would be attended by a reduction in the supply of gas coke and other important bye-products.

(To be continued.)

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Accounts.

THE following are the principal portions of the accounts which (along with the report that was published on p. 228 of last week's "JOURNAL") will be presented at the half-yearly meeting to-morrow of the South Metropolitan Gas Company.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the dividend is payable on £6,609,895 of stock; while the latter shows that the loan capital, the rate of interest on which is 3 p.ct., amounts to £1,895,445. The third statement is the capital account. It stands as follows: Amount received, £5,476,420; nominal amount added by conversion (less premium), £3,028,920—total, £8,505,340. The items of expenditure are as follows:

Capital account to Dec. 31, 1916		£5,367,056 11 9
Expenditure during half year to June 30, 1917—viz.:		
New buildings and machinery	£86,420 0 1	
New and additional mains and services	1,647 14 9	
New and additional meters	2,484 2 4	
New and additional stoves	5,456 6 0	
		96,008 3 2
Total expenditure		£5,463,064 14 11
Balance		13,355 5 1
		£5,476,420 0 0
Nominal amount added by conversion, less premium		3,028,920 0 0
Total		£8,505,340 0 0

The net revenue account shows a sum of £152,488 applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £194,152; renewal fund, £27,354; insurance fund, £79,068.

The following is the revenue account.

REVENUE ACCOUNT—*Expenditure.*

Manufacture of gas—		
Coal into store, including £5340 18s. 7d. for London Port and tonnage dues	£875,489 15 9	
Purification	14,959 8 9	
Salaries of Engineer and Officers at works	21,792 7 8	
Wages (carbonizing)	58,638 16 8	
Repairs and maintenance of works and plant, less £6182 7s. 3d. received for old materials	126,268 14 11	
		£1,097,149 3 9
Co-partnership or twelve months to June 30, 1917	28,620 18 8	
Less on Account	14,000 0 0	
		14,620 18 8
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes	£38,463 6 6	
Salaries and wages of officers, including rental clerks	24,191 11 0	
Repair and renewals of meters	29,832 6 11	
Repair and renewals of stoves	33,173 13 9	
Repair and renewals of gas-fittings	21,961 4 11	
		147,622 3 1
Public lamps, labour and materials £14,514 18s. 1d., less £13,968 6s. 1d. received for the same		546 12 0
Rents, rates, and taxes—		
Rents payable	£1,086 19 7	
Rates and taxes	77,309 7 0	
		78,396 6 7
Management—		
Directors' allowance	£2,852 7 6	
Salaries of Secretary, Accountant, and clerks	3,750 9 6	
Collectors { Ordinary	5,995 13 5	
Collectors { Slot meter	13,462 2 6	
Stationery and printing	5,431 7 6	
General charges	11,018 8 7	
Company's Auditors	112 10 0	
		42,622 19 0
Miscellaneous—		
Law charges		318 2 10
Parliamentary charges		379 7 11
Bad debts		878 13 7
Stolen from 587 slot meters broken open		155 3 3
Superannuation, sick, and accident funds		13,925 5 0
National Insurance Act charges		4,078 15 3
Gas Referees and Official Auditor		245 6 6
Leasehold renewal fund		1,000 0 0
War Bonus and War fund		104,051 2 11
Total expenditure		£1,505,990 0 4
Balance carried to net revenue account		172,224 13 4
		£1,678,214 13 8

Receipts.

Sale of gas—		
Lady Day, at 2s. 8d. per 1000 c.ft.	£557,805 4 7	
Midsummer at 2s. 8d. per 1000 c.ft.	403,366 16 2	
	£961,172 0 9	
Public lighting	15,632 10 2	
		976,804 10 11
Meters at rent	£44,293 11 7	
Stoves and fires at rent	40,970 19 4	
Gas-fittings at rent	60,324 18 10	
		145,589 9 9
Residual products—		
Coke, less labour and cartage	£365,545 10 11	
Breeze, " "	7634 8 5	
Tar and tar products, less labour	87,797 4 5	
Sulphate of ammonia " "	93,408 14 8	
		554,385 18 5
Rents receivable		1,364 12 1
Transfer fees		70 2 6
Total receipts		£1,678,214 13 8
Total amount paid in salaries for half year,	£42,831 2s. 3d.	
" " " wages "	£382,765 3s. 6d.	

Statement of Coal.

In Store Dec. 31, 1916.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1917.
Tons. 136,269	Tons. 798,530	Tons. 622,351	Tons. 1918	Tons. 310,530

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 7,778,157	Thousands. 136,280	Thousands. 7,344,700	Thousands. 7,602,047	24,748

Statement of Residual Products.

Description.	In Store Dec. 31, 1916.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1917.
Coke—tons	38,186	381,953	66,488	323,749	29,902
Breeze—tons	9,627	68,358	29,696	34,671	13,618
Tar—gallons	650,475	6,020,980	6,168,378	..	503,077
Ammoniacal liquor—butts	10,588	234,653	237,962	..	7,279

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £463,386; coke and breeze, £33,973; tar, ammonia, and products, £138,395; and sundry plant and stores, £303,412. The figures this time last year were: Coal, £149,255; coke and breeze, £14,570; tar, ammonia, and products, £132,365; and sundry plant and stores, £249,352. A sum of £77,168, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £125,389. The figures last year were £70,223 and £103,859.

CITY AND GUILDS EXAMINATIONS PROGRAMME.

JUDGING by the meagre response to the appeal made in several issues of the "JOURNAL" for the names of successful candidates in the last City and Guilds of London Institute examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting," there were this year, as was to be expected would be the case, far fewer than the customary number of students sitting. No doubt on the next occasion, and until the return of normal times, the same condition of affairs will prevail. Indeed, it is clearly foreseen by the authorities; for in the Institute's programme for the session 1917-18, which is now available, it is stated that, in the event of the continuance of the war, it will not be possible to hold certain specified examinations [not connected with the gas industry] in 1918; and it may also become necessary to suspend or modify others. But, unless notice to the contrary has been received, the registration of classes and other regulations must be observed. The price of the programme is, as usual, 9d. net [postage extra]; and it is published by Mr. John Murray, of Albemarle Street, W. The information given is, of course, necessary to both teachers and prospective candidates. Among the chief alterations compared with previous years, it is stated that candidates for Grade II. and the final examination in "Gas-Fitting" must forward certificates from their employers as to practical experience of the trade. Many of the lists of text-books and works of reference have been revised. Another point is that elementary school teachers will no longer be eligible for the award of prizes or medals.

The following are the dates fixed for examinations next year with which the readers of the "JOURNAL" are more particularly concerned: "Coal Tar Distillation and Intermediate Products" (written), Thursday, April 25; final (practical), Saturday, April 27. "Coal-Tar Colouring Matters" (written), Thursday, April 25; final (practical), Saturday, April 27. "Gas Engineering," Saturday, April 20. "Gas Supply," Saturday, May 4. "Gas-Fitting" (written), Monday, April 22; grade II. and final (practical), Saturday, April 27.

The Acting Examiners in the subjects that have just been named are: "Coal-Tar Distillation and Products," Mr. W. H. Coleman; "Coal-Tar Colouring Matters," Dr. J. C. Cain; "Gas Engineering," Mr. Samuel Glover; "Gas Supply," Mr. Walter Hole; "Gas-Fitting," Mr. Ralph Halkett. The special prizes offered include a series by the Salters' Company in connection with "Coal-Tar Distillation" and "Coal-Tar Colouring Matters;" and the Society of British Gas Industries once more offer prizes of £3 3s. and £2 2s. to the first and second candidates respectively at the final examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting," provided that such candidates are eligible under the rules.

There are stated to be now under construction in the United States a considerable number of large gas-engines for at least four of the biggest steel plants in the country. Some of these engines will be of more than 4000 H.P., and will be employed both for blowing and for driving electric generators.

DUTCH ASSOCIATION OF GAS MANAGERS.

The Forty-Fifth Annual Meeting of the Association was held on June 26 at Zwolle, under the Presidency of Heer J. van Rossum du Chattel, the Director-General of the Amsterdam Gas-Works.

In his opening address, the President remarked on the abnormal times through which the gas industry is passing. Hitherto, he said, all efforts have been directed towards an extension of business by increasing the sales of gas; but now things have altered, and, instead of an increase of sales, all kinds of efforts have to be made to reduce the gas consumption by as much as 35 p.ct. This reduction of 35 p.ct., which was demanded of the gas and electrical industries at the instigation of the Coal Distribution Bureau, could not be approved of, seeing that other industries were only ordered to make a reduction of 25 p.ct. in the quantity of coal used. The most economical use is made of coal when carbonizing in gas-works; so that the result of this regulation has been to increase the coal requirements. Efforts are still being made to get the restriction altered. Meantime many municipalities have taken steps to bring about economy in the use of gas. Economy in the use of gas is, of course, necessary, as the available quantities of gas coal in Holland are insufficient to provide for the normal consumption—the supply from England having been almost wholly discontinued. With the majority of gas consumers, this economy is certainly possible; for in gas consumption, as in many other matters, ignorance and thoughtlessness are responsible for a considerable waste of fuel. With all this, the supply of gas coal in the past year was inadequate and irregular, and the coal itself was sometimes of very inferior quality, as well as high in price. The bad quality of the coal has, as a matter of fact, caused serious difficulties in many works; and it is not to be wondered at that there should be trouble in maintaining the calorific value of the gas. For instance, there was received at the Southern Gas-Works at Amsterdam a supply of coal giving 7620 c.ft. of gas per metric ton, of a calorific value of only 475 B.Th.U.; while the coke was chiefly breeze.

The coal reserves on many of the gas-works have considerably diminished; and there is no doubt that, if the war has not ended, the coming winter will witness greater troubles than have so far been experienced. Indeed, on all sides there are difficulties to be faced. Yet they in Holland might think themselves fortunate, when they reflect on the circumstances of some other countries. The rules issued to govern gas supply in Rome are a striking example of this. In France, many of the private companies had been in trouble, owing to the gas prices stipulated for in the concessions. High coal prices not only left no margin for profit, but often led to a loss; so that with some of the smaller works, closing-down has been the final result.

Touching on the question of oil-washing, the President referred to Dr. R. Lessing's proposal for the use of dry scrubbers in connection with the extraction of benzol and toluol from coal gas, as described in the "Journal" for Feb. 13 and 20 last. Experiments with spent oxide had led to no success, as there was too much back-pressure and the oxide contained some constituents acting on the gas. More successful results were obtained with light porous inert material soaked with oil, which presented a large surface for toluene extraction. After saturation, the hydrocarbons could be easily separated by simple heating and condensation, following which operation the scrubber is immediately ready for use again. Then alluding to the effect of inert gases in illuminating gas, he expressed the opinion that this was a matter to which chemists might direct their attention. Personally, he would regard as not without advantage to have the maximum content of nitrogen officially fixed. Next there were some remarks on the recent report of the United States Bureau of Standards, on the relative value of gases of varying calorific power when used for household and industrial purposes; and the President then went on to say that Dutch managers have followed with interest the erection of an installation of Glover-West vertical retorts at Zaandam.

As to tar, the Committee of the Association have not yet decided whether distillation at the gas-works is the best way of dealing with this bye-product. It is certainly an encouraging fact that last year the use of tar for internal combustion engines extended largely. Coal tar, if it is carefully dehydrated and filtered, is as usable in Diesel engines as tar oil. The distilling of tar in gas-works has also shown the possibility of utilizing the large quantity of coke breeze available for the production of briquettes.

With regard to sulphuric acid, higher prices for this have, he said, to be paid; but, as the dividends of the acid-works for last year are three times as much as for preceding years, it may be reasonable to ask whether such high prices as are charged are justified. As a matter of fact, the same thing applies to tar prices. Buyers of tar make heavy profits, while the gas-works derive no advantage from the great demand.

The scarcity of solid fuel and the total absence of kerosene oil has naturally caused a big demand for new gas connections. In Amsterdam, during April and May of this year, the increase in the number of ordinary meters was 590, and of prepayment meters 1895—the corresponding figures for the whole of 1916 being only 149 and 2835; so that it was evidently a mistake to suppose that practically every house had already a gas supply. No wonder there has been some difficulty in the regular delivery of gas-meters.

After the address, the annual report of the Association was submitted; and this showed that there are at the present time 7 honorary members, 336 ordinary members, and 134 associate members.

The attention of those present was then directed to the question of gas managers' salaries—a matter of importance, in view of the increasing cost of living. After considering the advisability of taking combined steps to secure a higher rate of remuneration, it was decided by the Committee to bring the question before the meeting. Members were divided in their opinions—some thinking that such a course was not within the province of the Association; others that a more uniform system of regulating salaries was necessary, and that a movement towards this end could well be started by the Association; others again thought that nothing the Association could do would be of any use. Heer van Niftrik (Flushing) argued that the salaries of many managers are not in proportion to their responsibility, and are certainly lower than those prevailing in many similar positions. After much debate, it was agreed, by 53 votes to 45, to address the municipal authorities on the subject.

A report of the Committee on the Piping of Buildings was adopted by the meeting; so that henceforth the rules laid down will be considered as officially sanctioned by the Association. It must be mentioned, however, that the report stipulates that gas-works shall be free to make use of only such parts of the rules as may be deemed necessary for each town. A Special Committee was later on appointed to prepare a scheme of examinations in "Gas Supply."

These domestic matters having been settled, Dr. Alph Steger, Professor at the Delft University, read a paper on "Waste and Economy of Coal," in which he described the Dutch coal-seams and their approximate composition. He said the ideal method of utilizing coal would be to first carbonize those that are suitable for this treatment. The gas produced should be perfectly de-benzolized, and then distributed, as is the case in some parts of Westphalia, for the production of heat and power. The quality of this gas should be such that, though illuminating power might be totally absent, the calorific power would be almost normal. As a boiler fuel, the coke could not be consumed in solid form, but ought to be completely gasified in Mond producers. Cheap electric current could be obtained with this gas, so that it could become the chief source of lighting. All tar should be distilled, for its valuable products.

The paper was cordially received; the President suggesting that the discussion should take place through the columns of "Het Gas," so that the matter might be treated in a much more exhaustive manner than would be possible at the meeting. This proposition was unanimously agreed to.

The next paper was by Heer van Genderen Stort, the Manager of Messrs. Julius Pintsch's Dutch branch, on the "Thomas Gas-Meter as a Station Meter." He explained the principles involved in measurement by this meter, which was described and illustrated in the "Journal" for Jan. 21, 1913 [p. 186] and Aug. 25, 1914 [p. 463]. He pointed out that, in this system of indirect measurement, by gauging the quantity of electrical energy consumed in maintaining certain temperatures, an important factor is the specific heat of the gas. A Thomas meter designed for coal gas would give faulty results if used for blast-furnace gas. A subsequent communication by Heer W. Meyer Cluwen, described the "Production of Liquid Ammonia at the Arnheim Gas-Works." What the author had to say was much on the lines of the article to be found on p. 431 of the "Journal" for June 5.

In connection with the question-box, Heer van der Myle related a successful attempt to heat the different parts of his works by making use of one of the retort-house producers as a central heater. This method, it is thought, will be of interest to managers of small works. Formerly, the two retort-house producers were fitted with cast-iron bars, the yearly cost of renewing which was £2 10s. For these solid bars there were substituted others made of 1-in. wrought-iron gas-pipe, connected by bends; and through these tubes a stream of water was passed, so that they were constantly cooled. These home-made grates cost £1, and last a year; so that for the two the expense of renewals is 10s. less than with the solid bars. A complete set of bars is always kept in reserve. The water heated in the tubes passes through a system of pipes to the stokers' mess-room, the engine-room, the wet purification room, the purifier-house, the meter and governor room, and the workshops. Last winter, with an outside temperature of 7° Fahr., the temperatures in the buildings named varied from 35° to 55° Fahr. The consumption of coke in the producers has not increased, so that the heating is carried out with no expense as regards fuel; while all the coke previously used for separate heating of these departments is saved.

Heer Granpré Molière, of the Gouda Gas-Works, gave particulars of some results obtained with the St. Claire Deville process of condensation. This, he said, had been such a success that during last winter, which was very severe, naphthalene stoppages had been few and far between.

The meeting next year will take place in Groningen.

Gas-Works in Austria-Hungary.—The "Zeitschrift des Oesterreichischen Ingenieur und Architekten Vereins" states that of 170 Austrian gas-works 118 are municipal. Coal gas is made in 123 of the works, water gas in 6, acetylene in 31, air gas in 5, and oil gas in 5.

INTERMITTENT VERTICAL RETORTS FOR MEDIUM-SIZED AND SMALL GAS UNDERTAKINGS.

By F. G. Ambler, of Goodall, Clayton, & Co., Ltd., of Leeds.

[A Paper read before the Irish Association of Gas Managers, Aug. 14.]

The intermittent system of vertical retorts may lay claim to earliest erection and longest service. The process is to place a known weight or volume of coal into the retort, allowing it to remain a definite period, and replenishing with fresh coal. The system is positive and definite. By the steaming arrangements for the manufacture of blue water gas, the system has great flexibility for works of any size—high yields of gas per ton of coal, with high total heat values; and where illuminating power is still a consideration, this item is also well supported. The returns for ammoniacal liquor, tar, and saleable coke are favourable factors, as subsequent results will show.

Foundations.

Generally speaking, the vertical retort-bench requires a stronger foundation than is usually put in for a horizontal or an inclined retort-bench—due to the increased weight per superficial foot of area. Knowledge of the subsoil is an essential when deciding what form the foundations will take. Much care and foresight must be exercised at this stage. Careful examination of the ingredients, the "mixings" of the concrete, and its application are all important points to be watched for ensuring a good solid foundation.

Refractory Materials.

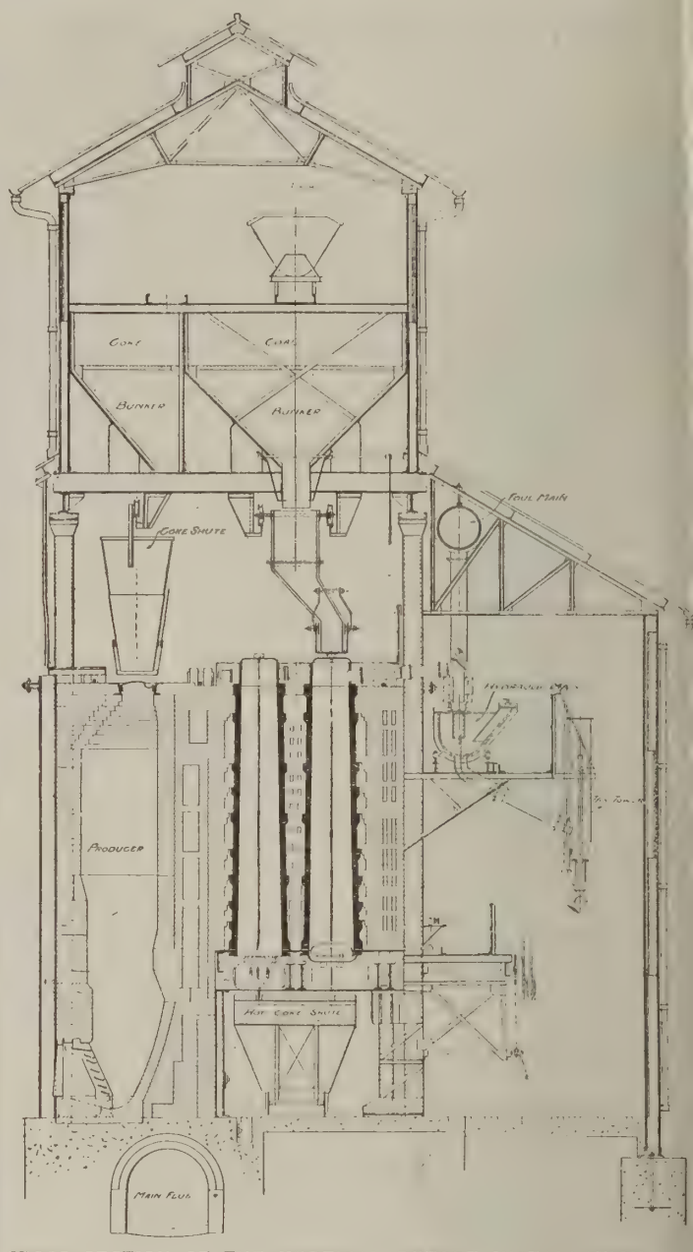
While speaking of retort-settings, a few remarks concerning refractory materials will not be out of place. This question still remains a very vexed one. Admittedly, the task of the manufacturer is not an easy one during the preparation and burning of the clay. Laboratory tests do not seem to supply the necessary information as to the behaviour under fire of the finished article, however carefully made. It is reasonable to say that to test refractory materials for retort-settings satisfactorily, working conditions must be imitated during the test as near as possible. In other words, the test must take place in an atmosphere similar to that prevailing in a retort-setting. This applies especially when tests for contraction are being carried out.

All refractory materials should be subjected to a good soaking and even heat in the kiln during burning—at the least 100° C. above any temperature it is likely to encounter during its working life. After all, much depends upon the manufacturer, especially in regard to the correct dimensions of the finished article. And in my opinion there is room for vast improvement in this respect. Why settings, after working the same coal, under the same conditions, and receiving similar treatment, should vary so much in behaviour is surely a question which only the manufacturer can answer. I have known retort-settings, built of the same maker's fire-clay material, which according to laboratory tests was quite acceptable, and yet some of them were worked-out much quicker than others. No doubt some of you have had similar experience. The ideal aimed at in any retort-setting should be for the whole of the brickwork structure to be of equal quality throughout, of a high degree of refractoriness, hence a homogeneous mass when under fire. Close co-operation between the maker and user is a step in the right direction. Much benefit can be obtained by such consultations; and it is to be hoped that the Refractory Materials Section of the Ceramic Society may be the means of bringing this about.

For the benefit particularly of those in the smaller gas undertakings, where they have neither apparatus nor time for conducting physical tests of refractory materials, the following method of ascertaining contraction or shrinkage has been found reliable; and, furthermore, it is within the reach of everyone. Take a fire-brick, for example, and break it in half, place one half under cover in a dry place and the other half in the combustion chamber of a retort-setting, and allow it to remain a week at least. Then take out the brick from the retort-setting and allow it to cool down gradually. When quite cold, fit this half with the half that has not been heated; and any appreciable contraction can be felt by merely rubbing the fingers at the point of fracture in the brick.

Description of the Setting.

The height of the setting from ground level is 22 ft., and it is 17 ft. 6 in. wide. The length of the course, or centres of settings, depends upon the number of retorts per bed. The retorts are rectangular in cross section, with rounded corners, and are built either moulded or segmental. The retorts are 13 ft. in length, 27½ in. × 14½ in. at the bottom, and 22½ in. × 9 in. at top, having a taper of 0·42 in. per foot. The retorts are set in rows of two, and can be arranged for four, six, eight, or ten retorts per bed. In the larger installations, there are eighteen retorts per bed, arranged in six rows of three per row. Each retort is mounted upon a cast-iron base-plate, which is a shade larger than the cross section of the retort—thereby forming a socket into which the retort fits loosely. This joint is made of rust-jointing. Each base-plate is provided with hinges on the under side for securing the bottom mouthpiece lid and eccentric catch. The base-plates are supported by strong sections of rolled steel joists running longitudinally, which trim into still heavier sections of rolled steel joists running crosswise, and carried by the main front buckstays.



CROSS SECTION OF THE VERTICAL RETORT INSTALLATION.

The retorts themselves are stayed by means of suitable floors and baffles; the latter conducting the heating gases in their travel through the setting.

Producer.

The producer extends to the full height of the bench from the ground level, and is of the stepped grate pattern. The cleaning door is at the ground level, and the feeding door at the top. The latter has a sealing device to prevent the leakage of air into the producer. The producer is fed every eight hours with cold coke from overhead storage hoppers, by means of a travelling shoot suspended on rails on the underside of the hoppers. The producer is always kept well filled—the fuel at the top never attains a red heat. The active or working depth of the fuel is about 7 ft. 6 in. from the ground level. As the producer outlet to the setting is slightly lower (about 6 ft.), the result is that a producer gas of constant and very high quality is evolved, having the following approximate composition:

	Per Cent.		Per Cent.
Carbon dioxide (CO_2)	7·00	Hydrogen (H_2)	9·00
Oxygen (O_2)	*nil.*	Methane (CH_4)	0·90
Carbon monoxide (CO)	25·00	Nitrogen N_2)	58·00

The cleaning of the producer is not an arduous task, owing to the remarkable low accumulation of clinker with grates of this pattern. No false bars are necessary. The fire is well shaken up regularly once every eight hours. This is quite sufficient to loosen any clinker formed, which eventually falls to the bottom of the fire and can be removed with a shovel along with the ash; the whole operation occupying about ten minutes. There is a constant supply of water to the ash pan.

Regenerator.

The regenerators are on each side of the producer, and extend the full height of the setting. They are of substantial design, and have a high efficiency. Short-circuiting is reduced to a minimum, and every floor or tier is easily accessible. The secondary air admitted at the bottom of the regenerator has a good time-contact or regenerative area. Sight-boxes are fixed at the bottom of the regenerator just prior to the setting-damper.

System of Heating.

The hottest part of the retort is at the bottom; the heat tapering off gradually towards the top. The primary air is admitted through the producer cleaning door, and leaves the producer at the outlets and into the combustion chambers, which are situated at the bottom of, and between, the retorts. At this stage it is met by the secondary air, which has travelled up through the regenerator and descended a central flue to the combustion chambers. Combustion is brought about by means of gas-nozzles of definite length. The heat regulation of these settings is quite simple; the one essential being to have each combustion chamber the same temperature throughout its length. This is attained by a definite length of gas-nozzle and a known ratio of secondary air and primary air and damper areas. When these balanced conditions are attained, very little adjustment is necessary afterwards. On gas-works where the coals used are fairly similar in character, these settings have worked for several months without any adjustment whatever. Constant supervision of the setting is not necessary—merely a daily inspection of the combustion chambers for temperature, which occupies but a few minutes.

Each combustion chamber has a separate supply of producer gas and secondary air; these being under control. The combustion chambers are worked at an average temperature of 1230° C. The heating gases travelling upwards are made to take a zig-zag course, by means of suitable floors and baffles, and circulate all round the retorts. The gases enter the regenerators at the top and travel zig-zag downwards to the bottom, through the setting damper, thence to the chimney, having heated the incoming secondary air *en route*. Sight-boxes are fixed to each combustion chamber, and others are provided at different heights, so that all the internal parts of the setting can be inspected at any time. To reduce radiation, heat insulating bricks are built in the front wall and on the top of the setting.

Method of Working.

The coal, coke, and breeze are elevated to overhead storage bunkers by means of a hoist. All storage bunkers are designed to hold a day-and-a-half's supply when the plant is on full load. Previous to charging the retort with coal, about ¾ cwt. of breeze is placed in the retort, by means of a special shoot. This measure is taken to raise the charge of coal into the heated zone of the retort and to protect the bottom mouthpiece lid from tarry matter. Coal is then fed into the retort by means of a travelling shoot, suspended on rails from the underside of the storage bunkers. This shoot hangs on a central pivot, so that it can be reversed in order to charge the other row of retorts. The average weight of a charge of coal is about 9·25 cwt. The retort, when charged, is not absolutely full; there being a cracking space of about 2 ft. in depth above the charge. The charge is allowed to remain in the retort for twelve hours. Twelve-hour charges, which includes two hours steaming for the production of blue water gas, have been found to give the best results. After steaming, the retort is discharged.

Steaming.

For the last two hours of distillation low-pressure steam (about 7 lbs.) is admitted at the bottom of each retort. There is a separate steaming arrangement to each retort, with separate steam valve and blow-off cock. On the outlet flange of the steam valve, a diaphragm plate is inserted having a hole in the centre, ⅛ in. in diameter, which has the outer edge cored out a little, so that only a certain volume of steam can pass when the valve is full open. The main steam supply from the boilers is provided with a stop-cock and reducing valve, safety valve, and pressure gauge—all the latter apparatus being in view and easy of access for inspection. Provision is left for cleaning the ¾ in. diameter steam supply for each retort.

The blue water gas produced is of superior quality, by reason of its passing up through the charge sweeping-out the remainder of the hydrocarbons left in the charge. The analysis given shows a percentage of methane which is not present in ordinary blue water gas. The percentage of carbon dioxide is low. This test was taken just after the first hour of steaming. The war has been the means of demonstrating to us a fact which many engineers a few years ago would hardly have thought possible. I refer to the

Analysis of Blue Water Gas made in Intermittent Verticals.

	Per Cent.
Carbon dioxide	1·72
Oxygen	0·27
Unsaturated hydrocarbons	0·21
Carbon monoxide	41·40
Methane	3·10
Hydrogen	49·40
Nitrogen	3·90

Calorific value (calculated) = 328 B.Th.U.

denuding of gas of such valuable light-giving and heat-evolving hydrocarbons, such as benzol, toluol, and naphtha; and yet the remaining gas is of a calorific value quite good enough for incandescent lighting, heating, and power purposes. There is no doubt that the days of the flat-flame burner and rich gas are gone; and I think it will be agreed that the gas supply of the future will be one of low-grade quality—that is anything from 450 B.Th.U. to 500 B.Th.U. gross.

When speaking of low-grade gas, I refer to coal gas diluted by an admission of blue water gas—the mixture having a low percentage of incombustibles. There is a vast difference between a gas adulterated and one diluted; and it is in the latter case where the manufacture of blue water gas in the vertical retort is a very valuable asset indeed. The water gas is simply diluting the richer coal gas previously evolved. High yields of gas per ton of coal, containing a large percentage of inert gases, with a consequent reduction of flame temperature, is surely false economy indeed. The working results of this system over long periods show that, with high yields of gas per ton of coal, there is a good hydrocarbon content and a low percentage of total incombustibles.

As to what happens in the retort during the process of carbonization, there is more to be said than can be effectively dealt with in the time at my disposal. It is generally accepted, however, that soon after the coal is charged into the retort, the gas produced for some time is drawn to the centre or cooler zone of the charge. The hydrocarbons thus escape being further cracked-up. This theory is supported by the thinner tar produced, with a low free carbon and naphthalene content. The gas evolved is practically free from naphthalene, the sulphur compounds are low, and is partly responsible for the increased yield of ammonia. The yield of ammonia is also enhanced by the steaming.

Discharging.

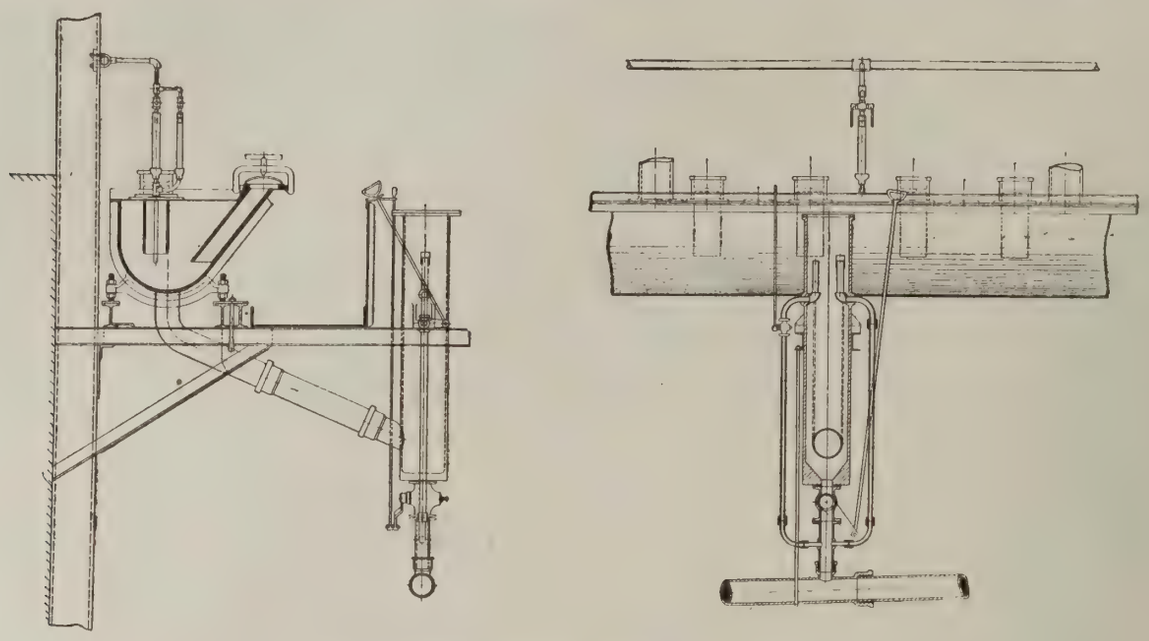
The coke is discharged into a travelling skip on rails, and taken to a quenching tower for quenching. The skip is geared, and can be propelled by hand. In large installations, the coke removal is performed by a coke conveyor, where it is led through screens and deposited in storage hoppers, being quenched *en route*. An interesting and ingenious piece of apparatus in connection with these settings is the discharging gear. Its duty is to open and close the bottom mouthpiece lids and release and put on the eccentric catches to them. The opening and closing of the lids is brought about by rack-and-pinion motion, hand driven. By a system of clutches any one retort-lid may be opened or closed; but only one at a time. By means of a lever to each lid, the eccentric catch is put on and tightened, or the reverse—released and taken off; either operation being performed by one movement of the lever. Additional eccentric levers are fitted to each lid to ensure a gas-tight joint (when closed) with the face of the lid and cast-iron base plate. This gear is very simple, and any stoker of average intelligence has no difficulty in mastering it in a short time. Apart from ordinary lubrication, the gear requires practically no attention, and is simple and durable. It is the only moving part in connection with the setting, and then it is only worked intermittently. The stoker when operating this gear is well clear of the heat, and is in no way inconvenienced.

Hydraulic Main and Gas Take-off Pipes.

The gas is led away from the retorts to the hydraulic main by means of a cast-iron take-off pipe and dip-pipe, 6 in. diameter; there being a separate take-off and dip-pipe to each retort. Each pipe is provided with a cleaning-out door fitted with a screw fastening. The hydraulic main has some very interesting and attractive points. There is a separate hydraulic main for each bed, mounted on cast-iron rests having adjustable feet. Running the full length of each main, and about 8 in. from the sloping side, a diaphragm plate is fixed, which extends in depth about 2 in. below the dip-pipes and is sealed in liquor. Thus, by means of inspection doors, the contents of the main can be examined at any time. Access to the hydraulic mains is provided by means of a gantry extending the full length of the bench.

Tar-pans rest on the bottom of the main, under each dip-pipe. The function of these pans is to catch any stiff tar or filth from the take-off pipe when augering. It is necessary to auger about twice a week; and the proper time to do this is the fourth hour after charging, when the contents of the pipe are soft and easily removed. The augering tool is simply a long rod, having at one end a disc of slightly less diameter than the take-off pipe. It will be admitted that to arrest suspended matter of the description mentioned is far better than to allow it to flow to the tanks to accumulate and in time become a source of annoyance. Hence the use of the tar-pans. These pans are emptied about twice a week; much depending on the class of coal being used.

The hydraulic main is worked upon the dry-wet principle—that is, seal only during charging and discharging, no seal during gas making. The raising and lowering of the seal is brought about by means of a dwarf tar-tower placed in front of each hydraulic main. The dwarf tower and the connections are the design of Mr. R. Nelson, Assoc. M. Inst. C.E., the Engineer and General Manager of the East Hull Gas Company. It is simple and very effective, as the following description will show. A connection is made from the bottom of the hydraulic main to the tar-tower base by means of a cast-iron pipe 6 in. diameter. Inside the tar-tower there are two wrought-iron pipes set vertically, each 2 in. diameter; one being known as the high-level overflow, and the other as the low-level one. Each of these overflows passes through the side of the tar-tower, then into the tar and liquor main to the tanks. There is a valve on the low-level overflow pipe, also a sluice-valve at the base of the tar-tower. All valves in connection with the tar-towers can be operated from the hydraulic main gantry. There is a constant feed of liquor to the hydraulic main. The low-level overflow is set at such a height that, at the point of overflow, the dip-pipes are unsealed by about ½ in. When the liquor overflows at the higher level, then the dip-pipes are sealed by ½ in. By the operation of one valve, the seal can be raised or lowered at will. The sluice-valve is opened periodically to run off the tar. In small installations,



ARRANGEMENT OF THE NELSON TAR-TOWER.

and some medium-sized ones too, anti-dip valves of an approved pattern have been put in; so that the raising and lowering of the seal is done away with.

This arrangement of hydraulic main and tar-tower dispels all probability of trouble due to tar or ammonium chloride. Level gauge, or not exceeding 1-10th pull, is maintained on the retorts; and under these conditions the temperature of the hydraulic main is not high enough to cause obstruction, as both the tar and ammonium chloride are held in suspension at this temperature. The tar-towers are provided with a removable cap; and the contents of the tower can be inspected at any time. After the hydraulic main the gas is conducted through cast-iron pipes to the foul main (the latter being of steel), through a retort-house governor to the condensing plant. All the gas connections are designed of ample area to assist in condensation.

Scurfing.

Scurfing is necessary every six weeks to two months. If the scurf is allowed to remain longer, it is apt to interfere with the discharge of the coke. Scurfing is quite a simple operation. The bottom mouthpiece lid is suspended in a hook, leaving a space of about 1 in.; a notched plate is placed over the top mouthpiece; and a fire-clay bung is placed in the gas take-off pipe. The hot retort induces a gentle current of air through—thus loosening the scurf, which falls on the bottom lid. From eight to ten hours are required for scurfing.

Bench Bracing and Supports, &c.

The retort-bench is substantially braced and supported longitudinally and crosswise. The main buckstays, front and back, are built-up of strong sections of channel iron and gusset plates, having strong bases, and are cross tied at four different heights. The front buckstays stand on cast-iron sole-plates. There are intermediate buckstays, front and back, of rolled steel joist section, which are also cross tied. The end buckstays are compound rolled steel joists having cast-iron distance-pieces between; the lower ends being anchored in the foundation, and the top ends tied by longitudinal tie-rods running the full length of the bench. In benches comprising three or more beds, volute springs are fixed at one end of the longitudinal tie-rods; so that the expansion of the bench is taken-up gradually. The overhead coal, coke, and breeze bunkers are carried longitudinally and crosswise by rolled steel joists supported from the tops of the main buckstays. The whole of the bench is enclosed in a steel building brick or concrete panelled.

Residuals.

Tar.—The tar produced from these verticals is thinner than that produced from horizontal or inclined retorts, having a specific gravity of 1·110 to 1·120. It contains a larger percentage of light and middle oils, and very little naphthalene and free carbon.

Analysis of the Tar.

Sp. gr.	1·110
Tar acids	5·5
Free carbon	4·0

Distillate through Open Retort.

To 170° C.	8·9	To 350° C.	11·0
,, 270° C.	27·0	,, pitch	50·8

Ammoniacal Liquor.—The yield of ammoniacal liquor (10-oz.), whether expressed in gallons per ton or as pounds of ammonium sulphate per ton of coal carbonized, will be found to be satisfactory, as subsequent results will show. There is an increase in the yield of ammoniacal liquor by 25 p.ct. over horizontal or inclined retorts.

Coke.—The coke produced from intermittent verticals is used for all kinds of purposes—for malting, furnace work, domestic purposes, bakehouses, &c.; and it has, when screened to size, proved an ideal fuel. It is hotter and more economical than inclined or horizontal retort coke.

Labour.

The labour costs on medium-sized and small installations are very low. With a plant of from 50,000 to 150,000 c.ft. per diem capacity, one man per shift can do all the work that is necessary —namely, charge and discharge the retorts, remove the coke, clean and feed the fires, attend to the hydraulic mains, and elevate coke, coal, and breeze. The duties of the stoker are comparatively

Analysis of Gas.

Installation.	CO_2.	O_2.	Unsat. Hydro-carbons.	CO.	CH_4.	H_2.	N (By Diff.)	N (By Est.)	Total Hydro-carbons.	Total Incom-bustible.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Sunderland	1·35	0·40	3·63	7·63	30·46	49·90	6·63	6·40	34·09	8·15
East Hull	2·56	0·36	3·28	8·27	27 95	49·82	7·76	—	31·23	10·68
Ossett	2·39	0·48	3·46	6·09	31·88	47·10	8·60	—	35·34	11·47
Morley	2·65	0·70	3·25	9·55	27·00	49 40	7·45	—	30·25	10·80
Truro	2·80	0·25	3·30	8·85	27·90	51·50	5·40	—	31·20	8·45
Averages	2·35	0·44	3·38	8·08	29·04	50·14	6·55	6·40	32·42	9·91

Working Results.

Installation.	Capacity of Plant.	Steaming.	Make per Ton (corrected)	I.P.(No.2 "Met.")	C.V. Gross.	Total Heat Value.	Tar.	Liquor 10-oz.	Sulphate Equivalent.	Coke for Sale.	Ash in Coal.	Description of Coals used.
	Per diem.		C.Ft.	Candles.	B.Th.U.	B.Th.U.	Gallons.	Gallons.	lbs. per ton.	Cwt.	P.Ct.	
Sunderland	700,000	Yes.	12,647	15·52	590·0	7,461,130	11·40	32·34	28·66	10·25	9·6	Mixture of second and third class unscreened Durham.
East Hull	1,000,000	,,	14,154	14·89	551·0	7,789,852	12·00	25·50	22·50	..	7·0	South Yorkshire unscreened.
Ossett	950,000	,,	14,036	..	533·3	7,485,000	12·30	30·00	26·58	10·92	6·5	South Yorkshire screened.
Morley	600,000	,,	13,562	..	559·4	7,586,500	11·60	32·80	29·06	10·62	10·0	South Yorkshire screened and unscreened.
Truro	300,000	,,	14,217	..	530·0	7,535,000	12·00	30·00	26·58	10·40	4·6	Yorkshire and Somerset screened.

ight when compared with horizontal or inclined retort work. Furthermore, the stoker has ample time to keep the plant clean and tidy. In a works of a capacity of 80 million cubic feet per annum, where an installation of intermittent verticals is installed, four men working in two shifts, perform the following duties (the capacity of the plant is 350,400 c.ft. per diem): Charge and discharge retorts, attend to, and clean, producers, elevate coal, coke, and breeze, and attend to the hydraulic main. Their other duties outside the retort-house are to attend to the exhausters, boiler, gasholder valves, pumps, wheel-away all the ashes, and keep the works clean and tidy. I give the above illustration in order to show what can be done with these vertical retorts as regards labour on medium-sized and small gas-works.

Renewals.

It was my intention to have given some particulars and details; but Mr. Nelson, of East Hull, will have something to say on this subject of quite up-to-date experiences. However, I can assure you that the costs are by no means increasing, or at any time have been considered excessive.

In giving the foregoing working results, I am indebted to Messrs. R. Nelson, A. E. Mottram, C. Dru-Drury, S. J. Ingram, and H. J. Hemmingway. The figures are over periods of many months from works where the coal gas supply is derived solely from intermittent verticals. They are in no way experimental tests, but actual working results. Where possible, I have given an analysis of the gas. The East Hull returns have since been exceeded.

Conclusion.

This system of vertical retorts is very simple, both in construction and management. The ability of being able to inspect each retort every day is a distinct advantage, and really a necessity; moreover, it involves no inconvenience. The absence of continuously running machinery, a definite and systematic order of routine, are points which on medium-sized and small gas undertakings are of the utmost value, especially on works where the duties of the stoker are not confined to the retort-house. Apart from working results, an installation of intermittent verticals carries with it a great reduction of retort-house labour; therefore, an increase of gas made per man. To a large extent labour troubles are solved. On plants for medium-sized works, and small works also, the retort-house labour is the same throughout the year. No doubt many of you, after the very trying experience of last winter with the difficulty of securing labour, not to mention the varying talents thereof, can appreciate what it means to know that the increased winter make can be met without the worry of finding extra men. Engineers who are in this happy position emphasize this fact very strongly; and fortunate indeed are they whose complement of retort-house labour is assured against labour difficulties. The absence of constantly moving parts and constant supervision are facts which place the labour question with these verticals on the same plane as ordinary retort-house labour—a semi-skilled job.

A REINFORCED CONCRETE TAR AND LIQUOR TANK AT BLANDFORD.

At a Meeting of the South-West of England Association of Gas Engineers, held at the Ashton Hotel, Taunton, on Thursday, the 2nd inst., Mr. G. F. Dunn, Engineer and Manager of the Blandford Gas Company, Ltd., read a paper on the "Construction of a Reinforced Concrete Tank at the Blandford Gas-Works;" and it was followed by a good discussion. The President (Mr. H. B. Chamberlain, of Trowbridge) occupied the chair; and there was a fair attendance of members.

The author said the provision of the tank was a war-time requirement; made necessary by the repeated failure in the supplies of sulphuric acid for the production of sulphate of ammonia. On one occasion in 1915, they were unable to obtain supplies for nearly four months; the result being that wells and tanks were soon overtaxed to store ammoniacal liquor, and it was necessary to run to waste. The available storage for liquor was equal to 8000 gallons, or three months' storage, as regards their own productions; but as the Company purchase the liquor from other works, this period was considerably reduced. In common with many other gas-works, the Company early in 1915 decided to wash their gas, as recommended by the Ministry of Munitions; and in June of the same year it was decided to discontinue entirely the sale of crude tar. It became evident, if loss was to be prevented, the Company would be obliged to put down a tar-dehydrating plant, with adequate storage for the purified tar.

The principal question for the moment appeared to be that of storage. Careful consideration was given to it, and the conviction was formed that the ideal arrangement would be an overhead tank construction of either steel or cast-iron plates. There were, however, several serious difficulties to overcome. The first and greatest objection was the lack of room for such a tank, necessitating the purchase of cottage property and dismantling. The second was that, owing to the high prices ruling and the difficulty of obtaining the material, it would have to be a second-hand one; and a second-hand steel tank of any capacity would have been a difficult thing to convey by rail and afterwards handle. It was therefore decided that the tank must be an underground one, and that it would not be wise to store dehydrated tar in it, but to use it for the storage of crude tar and ammoniacal liquor.

It was resolved to construct a much larger tank than was originally intended, and to provide for a year's production of tar of not less than 25,000 gallons, in order that it might be sold to the best advantage and at the most suitable time. The material favoured for the formation of the tank was reinforced cement concrete; and it was decided to construct by direct labour, in preference to inviting tenders and letting the work out to local contractors. This decision may be criticized. It certainly was not the easiest method. The deciding factor, however, was the labour position. The objection to direct labour not alone connected with war conditions was the speed with which the work would be carried out.

The site chosen for the tank was under an existing oxide shed; the nature of the subsoil being known to consist of chalk. It was also fairly certain that water would not have to be contended with. It was proposed to excavate to a depth of 12 ft. × 30 ft. in length × 15 ft. 6 in. wide; and the author hoped to be able to dispense with the use of timber for shoring purposes. This hope was fully realized; and never for a moment was there any suggestion of a fall of the subsoil. For the concrete, the aggregate selected consisted of ½-in. granite chippings, coarse grey Sitcheth sand, and slow-setting portland cement. It was decided to form the concrete of 3 parts aggregate, 3 parts sand, and 1½ parts cement. The reinforcement was to consist of six 1-in. vertical tubes, one being placed at each of the four corners, and an additional tube placed 14 ft. 7 in. from either of the corner verticals at both sides. The vertical tubes were connected by two tubes fixed horizontally; one being connected 3 in. from the point where the walls would meet the roof of the tank, and the other connected 5 ft. below. Solid drawn No. 8 gauge steel wire, secured to the vertical tubes, was stretched from tube to tube. The wires were placed 12 in. apart; the whole forming a skeleton frame. The corners were further strengthened by means of steel wire secured in the form of triangles placed horizontally. The vertical and horizontal tubes were all filled with neat cement, to exclude all air and increase their efficiency. The rolled steel joists forming part of the roof were of British steel, each having a safe permanent carrying capacity of 10 tons for a span of 14 ft. These were connected with No. 6 gauge steel wire, placed 12 in. apart, under and over alternately; provision being made for the whole of the iron and steel work to be covered or buried in the concrete.

After the bottom of the excavation had been carefully levelled and pounded, further chalk was taken out to receive the footings of the side walls. The thickness of the side and end walls of the tank, owing to the dressing necessitated by the removal of flints, was increased from 8 in. to an average thickness of 10 in.; the footings protruding some 6 in. on either side. Granite, sand, and cement alike were sifted; the two former being in addition washed. A wooden frame, capable of holding exactly 1 cubic yard of material, was used to measure the parts required to be mixed. To guard against the possibility of error in quantities, two pieces of lath were secured to the interior sides at the required height. Granite was placed in first, followed by sand, and finally cement on the top. The frame was then removed, and the contents thoroughly mixed in the dry state, while another quantity was being measured. Frame plates borrowed for the purpose were then placed in position and bolted together. The lengths of the plates was in such variety as to make it comparatively easy to form a complete frame, enabling the walls to be taken up continuously to a height of 2 ft. all round. Everything being in readiness, the concrete was lowered to the man responsible for tipping the contents into the recess forming the walls. A layer of concrete 3 in. in thickness was laid around the entire walls of the tank. The foreman meanwhile using a wooden rammer, the concrete laid was well pummelled until the air-bubbles had been excluded, and the voids filled in. It was found possible to raise the walls 2 ft. each course of the plates, until a height of 6 ft. had been reached. The bottom plates were then removed and fixed above the others.

After the height fixed for the roof had been reached, we excavated an additional foot of subsoil, and filled the trench with concrete formed as before. The purpose in view was to ease the walls of a portion of the weight of the roof and the material that might afterwards be stored above it. Needless to say, the concrete was well rammed round the whole of the iron forming the reinforcement. The steel joists were next placed in position. They were put 3 ft. apart; provision being made for two manholes, one formed at either end. The average thickness of the roof was 12 in. The steel joists were so placed as to be submerged in concrete on all sides. To avoid damaging the bottom of the tank while constructing the sides and roof, the floor was left to the last; the material being lowered through the manholes. After the plates had been removed, all irregular parts were carefully pointed with neat cement, and the whole of the walls, top, and bottom were washed down twice with cement wash. To facilitate the examination of the suction and delivery pipes, safeguard against a possible nuisance, and prevent loss of ammonia, four 6 in. flanged sockets were fixed in the concrete, with flanges to the top, to receive blank flanges. Arrangements were made for a 1½ in. pipe to carry off the displaced air to a small purifier to be

fixed for the purpose. After the tank had been finished, it was allowed to stand some four weeks before being used.

Particulars of Materials Used, Labour, and Costs.

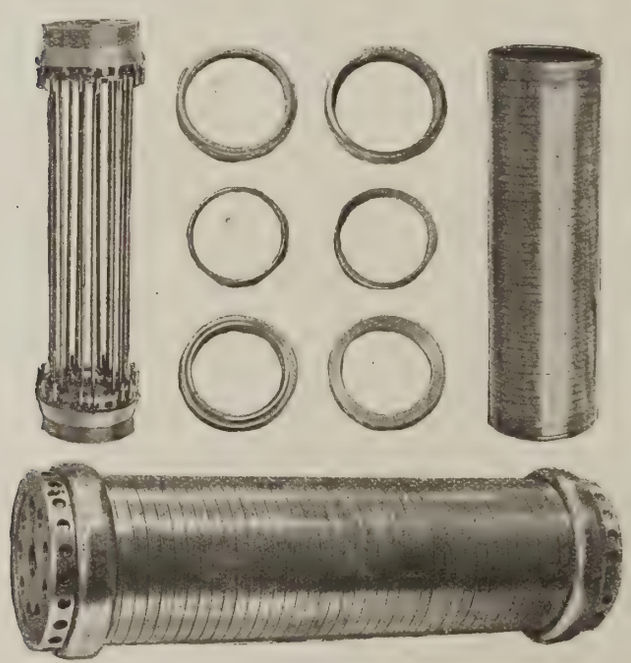
	£	s.	d.
Cement, including haulage, 18 tons 18 cwt. . .	51	11	7
Sand, including haulage, 52 yards	18	4	6
Granite chippings, 53 tons 11 cwt. including haulage	28	5	4
Rings, tubes, &c.	5	0	0
Ten British rolled steel joists, 8 in. × 5 in. × 17 ft., each	38	12	6
Haulage of chalk, &c.	18	10	2
Labour	84	0	11
Total cost, excluding supervision . . .	£244	5	0

Capacity of tank, 25,793 gallons.

After a further failure in the supply of sulphuric acid, it was found necessary to bring the new tar-tank into operation for the storage of ammoniacal liquor. It was then found that the tank was leaking to some extent; the level of the liquor falling to the extent of 3 in. in seven days. Acid supplies being renewed, the tank was emptied, and, after ventilation, was entered by men provided with sponge respirators and goggles. The most minute search, however, failed to reveal even a sign of a crack or anything that could account for the loss of liquor. Apparently the walls and bottom were extremely porous, in spite of all the care that had been taken to render them tight. Various materials for washing-down were considered, but all were discarded in favour of two coats of hot tar carefully applied to both sides and bottom. It is now believed to be tight; but as a further precaution, the tank is being filled with tar.

USE OF COAL GAS FOR MOTOR VEHICLES.

Mr. H. W. Saville, the Manager and Secretary of the Drogheda Corporation Gas Department, writes: "With reference to the use of coal gas for motor vehicles—in which the great difficulty has been caused either by a large unsightly bag, or the weight of the container for gas under pressure—I am enclosing details of an extremely light cylinder (made locally) for the carriage of compressed gas. I may state that the original experiments were made with a piece of Mannesmann steel tube, bored out to half the normal thickness."



Our correspondent sends two photographs [reproduced], also a sectional drawing prepared by the Murphy Submarine Pipe-Line and Flexible Tube Company, Ltd., of their "Safe" gas-cylinder, manufactured under patents applied for by Mr. S. J. Murphy. We give the following particulars as furnished by the Company:

The "Safe" gas storage cylinder is designed to carry higher pressure with perfect safety than ordinary cast-steel cylinders. In addition to this greater carrying capacity, the cylinder has the following advantages over ordinary steel cylinders.

Owing to its elastic construction, it will yield under shocks which would burst a cast-steel cylinder.

It is much lighter than the same size cast-steel cylinder, for two reasons: (*a*) The steel used in its construction, being drawn and rolled, has a much higher tensile strength and is perfectly uniform; so that no unnecessary metal is required. (*b*) Every ounce of metal in its construction is applied usefully. Radial pressure is resisted by the outer spiral winding. Longitudinal or axial pressure is resisted by the internal axial wires. Therefore the steel in both cases can be correctly and not unduly proportioned. If the envelope or shell of the cylinder were required to serve the double purpose of resisting axial as well as radial pressure (as is the case with cast-steel cylinders) a lot of unnecessary metal would be involved; and furthermore a shock would crystallize it, as such a cylinder would be inflexible or rigid.

It is cheaper to manufacture, because all the material of the cylinder, except the end, is rolled in long lengths. Perfect uniformity of manufacture minimizes the number of scrapped cylinders.

The cylinder can be made to withstand almost any pressure, combined with a reasonable margin of safety. Cylinders 6 in. internal diameter for pressures of from 1 lb. to 10,000 lbs. per square inch are quite practical.

The cylinder can be made from any high tensile material that is unweldable or will not solder, and which derives its high tensile strength from rolling, like Duralumin, alloy steels, &c. The cylinder is composed of thin weldless steel tubing which is not required to be of any great strength, as its purpose is merely to form a hermetical envelope. It need be no thicker than is required to avoid porosity. Outside this steel tube is wound spirally and in opposite directions, high tensile steel tape or ribbon of such thickness as will give the required radial resisting power. At each end of the tube, and surrounding the ends of the winding, are steel ferrules or rings.

Two steel dome caps close the ends of the tube by means of a special internal expanding joint. The packing or sealing-ring normally fits the interior of the tube loosely; but when forced up on the rim of the dome it expands against the interior of the tube, resulting in a perfect seal of the ends. Without the protection of the ferrules surrounding the ends of the tube, the expansion of the packing ring would distort the tube at the ends. The effect, however, is to combine all members rigidly together at the ends.

To prevent the ends from blowing-out or from putting undue strain on the tube envelope, the ends are connected by high tensile steel wires. In the smaller size cylinder the packing ring sealing ends are demountable, and are forced in position or expanded by means of a screwed ring. In larger cylinders the same style of packing ring is used; but a portion of the dome end is swaged against the ring, forcing it into position. In the largest size cylinders, the joint is effected in a similar manner; but bolts are used instead of the swaging process.

An Outside Engineering Observer on Motor Driving by Gas—The "Inerts" Question.

Writing on this subject, the Engineering Correspondent of the "Daily Telegraph," among other points, remarks: Even were petrol freely obtainable, its present prohibitive price of 7s. 6d. per can would be sufficient to compel motor users to turn to alternative fuels. To force petrol users to pay 3s. 9d. per gallon for a spirit that but a few years ago was selling retail at less than one-quarter of this price may, of course, be a move on the part of the importers that, if not inspired by the Government, is perhaps officially approved in, that it tends to conserve our petrol supplies, and at the same time causes motor users to turn their attention to the possibilities of coal gas—a vastly cheaper fuel, and one that the Government wishes to be used to an increasing extent. . . . As this use of coal gas for motor propulsion becomes more general, we shall find not only the gas companies setting up rows of standards and meters to meet the new demand, but also that enterprising garage proprietors and others, whose petrol selling business has vanished almost to zero, will take steps to have their premises similarly equipped. Filling stations need to be fairly close together, in view of the fact that present-day containers usually hold only enough gas to enable a run of about twenty miles to be made. Experience shows that about 250 c.ft. of coal gas is equivalent to a gallon of petrol, which means that, at 2s. per 1000 c.ft.—a fair average price throughout the country—gas is equal to petrol at 6d. a gallon. Even were gas twice as costly, it would still work out vastly cheaper than petrol. It must be admitted that the power derived from coal gas varies somewhat. This on account of the varying quality of the gas supplied in different towns. The calorific value is in many instances now below the 500 B.Th.U. which has come to be regarded as the standard, and the percentage of inert gases is far higher than should be allowed. If some gas companies can supply coal gas having only 10 p.ct. of inert gases, it is clearly undesirable for others to pass into the mains gas containing as much as 30 p.ct. This explains why motors run farther and climb hills better on one company's gas than on that of another. Those supplying the better quality should receive their reward in an increased "motor load," for whereas residents in a district having poor gas cannot change their supply, motor owners will soon discover, and make a point of refilling in, those districts where the calorific value of the gas is high. This is not a mere academic point. The use of coal gas for motor propulsion is bound to grow rapidly and to become an important source of revenue to gas companies. It is not likely to be merely a war-time matter, for petrol after the war will still be infinitely more costly than coal gas, seeing that America will soon have so many motors in use—there are already over 4 million—as to leave no petrol available for export.

Calorific Standard Application and Orders.—The Board of Trade inform us that the Sunderland Gas Company have applied, under the Standard of Calorific Power Act, for an Order, with 500 B.Th.U. as the standard. The fresh Orders made are to the Redditch Gas Company, Teignmouth Gas Company, Worthing Gas Light and Coke Company, Stretford Gas Company, British Gas Light Company Ltd. (Hull Station), Brecon Gas Company, Sutton Gas Company, and Bexhill Water and Gas Company.

THE "DIRECT" PROCESS FOR THE MANUFACTURE OF SULPHATE OF AMMONIA.

From the Annual Report of Mr. W. S. Curphey, the Chief Alkali Inspector.

In his report issued a year ago, Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, 1906, gave particulars of an inquiry in connection with the adoption by gas-works of the direct process of sulphate of ammonia manufacture, which had been undertaken to endeavour to ascertain the directions in which improvement might be looked for, both with respect to more regular working of the purifiers and a higher yield of sulphate. This section of the report will be found in the "JOURNAL" for Sept. 26, 1916, pp. 606-611. In the report dealing with the year 1916, which has just been issued, Mr. Curphey sets forth the results of a further study of the "direct" process, which has been made in continuation of the work already summarized; and the first portion of this section of the report is here reproduced—leaving the other part to be similarly dealt with subsequently.

Owing to the prevailing war conditions, operations throughout the industry have been extremely irregular with respect to the make of gas and quantity and quality of acid supplied. Labour shortage has been serious, and the time of works' managers and their staff has been fully occupied elsewhere than in the sulphate-house. A complete survey of the field has therefore been impossible, apart from the fact that the official time for investigation work of this kind has had to be seriously curtailed. Attention has been concentrated therefore on the conduct of operations in two works, widely different with respect to scale of operations, but of representative character.

Before attempting to discuss the results obtained during the past year, it will be well to briefly review the conclusions reached in 1915. In 1915, it was found that the "direct" process, as then conducted at twenty-one works, was, with few exceptions, yielding a return of sulphate far below expectations. In place of the 25 to 30 lbs. of sulphate which was looked for when the process was first adopted seven years ago, the recovery barely exceeded 15 to 20 lbs.; and not only was the recovery of ammonia poor, but the whole system of oxide purification in certain works was subject to mysterious and anomalous periods of disorganization. It was found, in general, that such disorganization was most frequent when the oxide was highly charged with moisture. At such times it was apt to "sour" in the boxes, and the bye-passing of a large amount of ammonia often failed to activate the sluggish material.

Various suggestions were made to effect the desired improvement—careful regulation of the moisture content of the oxide, the use of a washer to control the ammonia content of the gas entering the purifiers, the use of steam-pipes below the bottom grids to maintain the working temperature of the boxes during the winter months, protection of the boxes from rain and cutting winds, and the employment of control thermometers in the system. During the past year, opportunity has been found, through the willing co-operation of the management and their staff, to test the value of these suggestions. It is gratifying to be able to state that substantial advance has already been made towards a more scientific control of plant; that the recovery figure for sulphate shows improvement; and that periods of disorganization can now be anticipated with some degree of certainty, even if they cannot always be prevented owing to causes beyond the power of those in charge to control—causes due to irregularity in the delivery and quality of necessary material and to fluctuations in the make of gas, which has varied abnormally during the past winter.

The elucidation of the problem, however, is by no means complete, and further work remains to be done before the effect of the varying factors is satisfactorily determined. The problem was fully discussed in its theoretical aspect in the annual report for 1915. Considerations there set out led one to infer that the following conditions were those best suited to maintain the purifying material at its highest state of efficiency; and such conclusions were believed to be in harmony with best modern practice.

1. *Due Hydration of the Oxide* (say, 5 to 10 p.ct. of moisture), such hydration having regard rather to the reactive ferric hydrate content of the mass than to the total mass of material, active and inert.

2. *Temperature.*—(*a*) Crude gases entering the system to be dry and cool rather than moist and warm. Low moisture content is the essential requirement. (*b*) Oxide.—Temperature in the "sulphiding zone" to be such as to enable the gas to carry as vapour the whole of the moisture equivalent to the sulphuretted hydrogen absorbed—say, 70° Fahr. (21° C.). Temperature in the "oxidation zone" to approximate to this, so that water of hydration set free in the "sulphiding zone" and retained in the sulphided mass may be reabsorbed through hydration of reformed ferric oxide, and not carried away in the exit gas and lost to the system,

3. *Impurities.*—The crude gas should be freed, as far as possible, from tar fog, oils, naphthalene, and hydrocyanic acid, and should contain a trace of ammonia—say, 0·5 to 1 grain per 100 c.ft.—and oxygen equivalent to half the volume of sulphuretted hydrogen present.

4. *Purifier Boxes.*—These should be protected from the cold, and should be worked in rotation in such a way as to bring the material richest in ferric hydrate into contact with gas richest in sulphuretted hydrogen, and the material richest in sulphide into contact with gas poorest in sulphuretted hydrogen (but relatively rich in oxygen).

5. *Direction of Flow.*—This should be downwards, not upwards. The area of contact is thus increased, and the risk of caking diminished. Pressure tends to equalize itself, and the rate of flow is rendered more uniform.

6. *Regularity of Working.*—Conditions throughout should be as regular as possible. Material assistance would be afforded were it possible to record the temperature of the oxide in the boxes and in the inlet and outlet gas-mains.

Such were the conclusions reached with respect to the principles that should govern the working of a purifier system under ideal conditions. Unfortunately, in the "direct process," as usually worked, ideal practice is departed from in almost every particular. Oxide of iron is sometimes delivered at the works, and has to be put into immediate use, with a moisture content of over 50 p.ct., and at a time when the make of gas is at a maximum; the crude gas leaves the acid "bubbler" at a relatively high temperature and highly charged with moisture; the acid content of the bubbler varies within wide limits, and the surface layer (that last in contact with the coal gas as it leaves the system) has on occasions been found alkaline, while the bottom layer has been highly charged with acid; the purifiers are in exposed positions and subjected to great changes of temperature, and work in sequence with upward flow of gas. Conditions of working are thus often far from ideal, and each manager has his own special difficulties to contend with.

Irregularity of working has undoubtedly been one of the main causes of disorganization, and sufficient regard has not been paid to the fact that the process is essentially one that calls for chemical supervision.

Investigation during the past year has been specially directed to the attainment of two ends:

(1) To determine the conditions best suited to maintain the efficiency of the oxide purifiers at a maximum.
(2) To determine the cause of the relatively low yield of ammonia in the "direct" process, and to devise means for prevention of loss.

1.—Conditions Controlling the Efficiency of Oxide Purifiers.

(*a*) *Hydration of Oxide.*

The importance of maintaining the purifying material in a condition of suitable hydration has long been recognized in practice. The question was fully discussed in the annual report for 1915. It was there pointed out that, apart from the physical condition of the oxide originally charged into the purifiers—bog ore or artificial—the character of the material is progressively undergoing change as the proportion of free sulphur and associated impurities increases, and that an oxide that contained at the start (say) 60 p.ct. of reactive hydrate ($Fe_2O_3xH_2O$), at the end, and when fully spent, may contain less than 25 p.ct.

Opinions differ with respect to the degree of humidity that is most suitable for use in coal-gas purifiers. Thus, it was recently stated by Mr. W. C. Jones, of Brierley Hill (in a paper read before the Midland Association of Gas Engineers and Managers on Oct. 26, 1916),* that if "two samples of bog ore were submitted—one containing (say) 40 to 45 p.ct. of moisture, and the other containing 55 to 60 p.ct.—and where the physical condition appeared to be the same, he would, without hesitation, choose the one containing 55 to 60 p.ct. of moisture. Further, that the best bog ore he ever used was one that contained 59·5 p.ct. of moisture." This opinion is founded on personal experience, and deserves attention. Many gas managers, however, would be disposed to question the correctness of this view, and experience of the working of the "direct process" has led one to favour the use of an oxide with low moisture content, and especially to avoid the use of fresh oxide highly charged with moisture. Periods of disorganization have been most frequent with a very moist material; less frequent when oxide has been dry. Nevertheless, it is doubtful whether any general rule is applicable, in view of the varying conditions of practice. One has to consider, not only the use to which an oxide has to be put, *but the conditions under which it is employed.*

The system of coal gas purification described by Mr. Jones is worked on the "backward rotation system," the last box in the series always becoming the first at each change, and the changes being made when sulphuretted hydrogen is found to be passing the outlet of the second box in the series. The make of gas at Brierley Hill has not yet reached 400,000 c.ft. per twenty-four hours, with four boxes of 20 ft. square by 6 ft. deep. Each box

* See "JOURNAL" Vol. CXXXVI. p. 237.

is provided with "hurdle" grids; the direction of flow being downwards. Further, the oxide is carefully prepared and charged in a light friable state, and in a condition of mild alkalinity, secured by treatment, if necessary, with ammoniacal liquor or by addition of alkali. Conditions are thus extremely favourable for efficient working, and one would not be led to anticipate trouble where the rate of flow of coal gas at its maximum is less than 1000 c.ft. per square foot superficies per 24 hours, with a total volume of oxide exceeding 24 c.ft. of gas per 1000 c.ft. per 24 hours. Mr. Jones further favours the use of a high percentage of air. "Anything up to 5 p.ct.," he says, may be "safely used." No temperature records are given by Mr. Jones; but the system of purification worked by him is essentially one that tends to *lose*, not gain, moisture. Oxide, on one occasion, charged fresh with a moisture content of nearly 60 p.ct., was withdrawn for sale with 6·8 p.ct. of moisture and 61 p.ct. of sulphur. Of such an oxide, 100 tons, when charged, would contain 60 tons of moisture; it would, on removal, weigh 124 tons, of which 8·4 tons would be water. Over 51 tons of water have, therefore, been removed from the system, in addition to the whole of the water produced by oxidation of the sulphuretted hydrogen in the crude gas. A similar case was recorded by Mr. Wm. Bennett with "hurdle" grids in use with a "rotation" system at Greenock.

With the "direct" process, as ordinarily worked, conditions are very different. The direction of flow is usually upwards, not downwards. The "backward rotation" system is rarely used; and the boxes are worked in sequence. In the two works kept specially under observation, the make of gas on occasions has reached 1200 c.ft. per square foot superficies per twenty-four hours, in place of the limit named by Mr. Jones—1000 c.ft.; and the volume of oxide in relation to make of gas shows equal variation, being 8 c.ft. of oxide and 6·7 c.ft. respectively, in place of the 24 c.ft. at Brierley Hill. Further, crude gas in the "direct" process leaves the acid bubbler at a relatively high temperature (it often exceeds 90° Fahr.), and is subjected to very imperfect cooling before entering the purifiers; and where cooling is more efficient, the condensed moisture removes much of the residual ammonia the presence of which is so essential for the desired reactions in the boxes. The boxes, finally, are often placed in the open air and in exposed positions. Working under these adverse conditions, moisture tends to condense within the system, and water evaporated in the forward boxes condenses in those that follow. The policy of ensuring the use of a relatively dry oxide in the "direct" process, therefore, is certainly one that fully justifies itself in practice. But it is not contended that the same procedure is applicable in works where conditions may be different; each manager must determine the necessary degree of humidity for himself.

Temperature.

It is much to be regretted that experience is lacking with respect to the working temperature of oxide purifiers. The question was fully discussed in the annual report for 1915; and the conclusion was there reached that a working temperature of 70° to 80° Fahr. (21° to 27° C.) should be suitable under ideal conditions of work. During the past year, through the courtesy of managers, and with the willing co-operation of their staff, a complete set of temperature observations has been made at two works operating the "direct" process. Results indicate that, under the special conditions existing in this class of work, temperatures much exceeding the limits named above are consistent with efficiency. No similar data have yet been obtained with respect to ordinary coal-gas purifiers. This is a problem that might well engage the attention of those in charge. Undoubtedly purifiers generally would be far better under control, more especially during the winter months, were the boxes better protected from the weather and maintained at a steady temperature—controlled, if need be, by means of some steam-pipes. In this connection, the adoption of a "rotation" system of working would appear to offer advantages, since the cyclic movement of the boxes brings them successively into the reaction zone, and thus helps to maintain an even temperature throughout the system, and minimize the local deposition of moisture, which is such a source of trouble during the colder weather (also, see report for 1915, p. 23). Where adopted, the "backward rotation system" is well spoken of in the "direct" process.

Ammonia.

The part played by ammonia in oxide purification still remains obscure. The matter was fully discussed in the 1915 report. Experience confirms the view that, while purifiers will undoubtedly work well under conditions which result in the formation of "soluble salts of iron" (ferrous sulphate), the activity of the oxide is markedly higher when sufficient ammonia is present in the crude coal gas to maintain the oxide in a neutral or slightly alkaline condition, and in some works the life of the oxide has been markedly extended by the supply of a controlled amount of ammonia to the boxes.

During the past year special attention has been directed to determine the minimum amount of ammonia necessary to maintain the purifiers at maximum efficiency. Analysis of the crude gas has been made, and the supply of ammonia carefully regulated by means of a bye-pass tap or rotary washer fed with ammonia liquor. Results are difficult to interpret; but there is reason to believe that the amount of ammonia required to maintain the oxide in a state of neutrality bears direct relationship to the amount of ferrous sulphate formed, and that the formation of ferrous sulphate is favoured by excessive moisture and possibly by low temperature. Ferrous sulphate is a normal sulphiding reaction product; although in small amount. During revivification, under suitable conditions, it is reconverted into ferric hydrate by the agency of alkalies or carbonates in the oxide ["Lux" is especially rich in soda; bog ores contain calcium carbonate]. During sulphiding, however, it appears to be capable of coexisting in the mass with sulphide of iron, unless sufficient ammonia be present to decompose it. Revivification seems to proceed more slowly when ferrous sulphate is present—*cf.* "souring" of oxide (report for 1913). It is possible that the presence of ferrous sulphate tends to inhibit the action of oxygen upon the sulphided mass, and that its removal by the addition of an alkali, such as ammonia, is favourable to the reactions which result in the regeneration of ferric hydrate in the "oxidation zone" (see 1915 report). The amount of ferrous sulphate actually present at any given moment in the mass appears to be small—probably a fraction of 1 p.ct. in normal working; but in relation to the actual reacting weights of sulphuretted hydrogen and ferric hydrate the amount cannot really be regarded as negligible. During any given period of working that precedes fouling, a proportion only of the oxide takes part in the reactions. It is the surface layer that acts, rather than the denser substratum; and if ferrous sulphate be formed on the surface layer, its conversion into ferrous hydrate or sulphate may have a profound effect upon the catalytic activity of the material. In any case, and apart from catalytic considerations, reconversion of ferrous sulphate must directly activate a relatively large amount of material otherwise incapable of absorbing sulphuretted hydrogen.

In experiments with pure hydrated oxide described in the report for 1912, the amount of ferrous sulphate produced was too small to be estimated with accuracy; but it could always be detected in the sulphided product by qualitative test. The analysis of spent oxide given in Table III. of the report for 1915 [see "Journal," Sept. 26, 1916, p. 610] indicates that, under suitable conditions, an amount of ferrous sulphate may be formed cumulatively exceeding 4 p.ct., of the total sulphur in the revivified product. No doubt a large proportion of this is derived during revivification from disulphide normally present in spent oxide.

Let us suppose that in a given mass of revivified spent oxide 16 tons of sulphur are present—free and combined—equivalent to 17 tons of sulphuretted hydrogen, that the crude coal gas contains 1 p.ct. of H_2S, and that 1 p.ct. of the total sulphur formed was originally present in the purifiers as ferrous sulphate. Then, by calculation, the volume of gas containing 17 tons of sulphuretted hydrogen will be:

$$\frac{17 \times 2240}{\cdot 095} \times 100 = 40 \text{ million cubic feet at } 0^\circ \text{ C.}$$

The weight of sulphur converted into ferrous sulphate is:

$$\frac{17 \times 2240 \times 7000}{100} = 2{,}650{,}000 \text{ grains.}$$

Now 34 parts of H_2S in the form of $FeSO_4$ require 34 parts of NH_3 to neutralize them. Whence, the ammonia required is:

$$\frac{2{,}650{,}000 \times 100}{40{,}000{,}000} = 6\tfrac{1}{2} \text{ grains per 100 c.ft.}$$

Exact data are lacking to determine the amount of ammonia present in the crude coal gas entering the purifiers in the older process; but in the "direct" process test shows that a quantity far exceeding this amount is required during periods of disorganization. During regular working 6½ grains should suffice. In an experiment described later, where fresh bog ore containing 16 p.ct. of moisture was sulphided by crude coal gas containing about 6 grains of ammonia per 100 c.ft., the sulphided product contained a distinct trace of ferrous sulphate.

If the need of admitting a certain proportion of ammonia to the purifiers be accepted, the question arises as to what point in the system we are to introduce it. While, undoubtedly, the bulk of the work must be done in the first purifier, temperature records indicate that the bottom and middle layers of the second purifier are by no means inactive, and at works [such as "E," below], where an exit test at the exit of the third box is relied upon, all three layers in the second box should be operative. It would appear desirable, therefore, to admit a certain proportion of the ammonia direct to the second box, in addition to that supplied to the first, in place of supplying an excess to the first box, in the hope that some of it may escape absorption in the upper layers of oxide and enter the second box. During the past year the effect of such a secondary supply of ammonia has been put to the test; but a final decision has not been reached, as the available bye-pass was too small for the work. A larger supply of ammonia has now been provided, and further tests will be made.

Impurities.

The importance of freeing the gas from tar fog, oils, and naphthalene is generally recognized. The effect of hydrocyanic acid upon purification was discussed in the report for 1915, and its removal advised in the interests of efficiency. Cyanogen recovery—by scrubbing with ferrous sulphate—is now regularly practised at "Works E"; but removal of the hydrocyanic acid has not obviated purifier troubles. Improvement has resulted; but this is mainly attributed to the use of drier oxide and more careful control of the ammonia bye-pass, aided by the use of steam.

Consideration of all the results hitherto obtained has led to the conclusion that in large-scale practice exact control of working

with a view to determine the effect of varying factors on efficiency s practically impossible, and that it is essential that large-scale ests should be repeated in the laboratory under simpler condi-ions, if reliable data are to be forthcoming. A beginning has been made with this work, and it is hoped that opportunity may be found to continue it during the present year. Preliminary results are suggestive.

k.—Recovery of Ammonia in the "Direct" Process. An Examination into the Causes of Loss and the Means for Improvement.

The relatively low yield of ammonia in the "direct" process was adversely commented on in the report for 1915. At that time ammonia was being supplied to the purifiers in certain works with ittle regard to the requirements of the process, in an endeavour o secure greater freedom from purifier troubles, and the uncon-trolled use of ammonia generally was considered responsible in great measure for the low yield of sulphate at works where it was practised. At a later date, opportunity was found to examine the working of the virgin liquor stills. Exact data were not available to decide the amounts of ammonia supplied to the "bubbler" by the still and crude coal gas relatively; but it was evident that at certain works at least 50, perhaps 60, p.ct. of the total ammonia was supplied by the virgin liquor—an amount far in excess of that previously supposed. It was further found that the stills were too often worked with little regard to the need of maintaining a regular and adequate supply of lime to the "fixed" section, and generally that the due regulation of steam and the efficient work-ing of the condenser received too little attention. Examination by test of the effluent spent liquor showed that very serious loss of ammonia was taking place at some works, that this ammonia was chiefly present in the "fixed" form, and that insufficiency of lime was responsible. At one works, ammonia equivalent to no less than 5½ lbs. of sulphate of ammonia per ton of coal carbonized was being run to waste, 97 p.ct. of which was in the "fixed" form; at a second works, ammonia equivalent to 5 lbs. of sulphate of ammonia (99 p.ct. "fixed"); at a third, 3 lbs. (83 p.ct. "fixed"). It is only fair to state that the management in every case at once took steps to remedy this condition of things, so regrettable in view of the importance of conserving national resources. Efficient working of the still is not a difficult matter, even for an unskilled man, if the precaution be taken to apply a simple qualitative test to the effluent. A distinct odour of ammonia in the hot liquor as drawn denotes insufficiency of steam or too rapid a flow of liquor; an increased odour on the addition of a pinch of lime denotes the presence of "fixed" ammonia and deficiency of lime. Managers would be well advised to test their effluents periodically—the quality of the slaked lime is apt to vary, and a supply that may be adequate with lime of good quality may be seriously deficient with a poor material. Such test is automatically applied when a portion of the effluent is used hot for the preparation of the milk-of-lime feed. This practice has the added advantage of minimizing the volume of the spent liquor to be dealt with. Further facts are presented later.

It is worth considering, also, whether the Liebig condenser might not be used as a preheater where the still employed is of the continuous type.

It is a fact, however, that where every attention has been paid to prevent loss of ammonia, the yield of sulphate is still low, judged by relative standards; and the question arises: Are we justified in assuming a recovery figure of 28 to 30 lbs. of sulphate of ammonia per ton of coal in the absence of reliable data regard-ing the actual amount of ammonia that leaves the retorts? Late in the year an attempt was made to determine the amount of ammonia in the virgin liquor and crude gas entering the bubbler at "Works G" [referred to later]. The result is significant, and indicates that further inquiry is called for. The absolute figure for the recovery of sulphate in the "direct" process is undoub-tedly disappointing; but the *percentage* recovery figure may prove to be better than one has generally supposed.

In conclusion, and before proceeding to a discussion of the data obtained at "Works F" and "G," it may not be considered out of place to invite all those who are interested in gas-works problems to assist in elucidating some of the many questions calling for study. The field is a wide one. There must be many works' chemists with expert knowledge who have facilities for research far exceeding those available to those who, in a sense, have to attack these problems from the outside.

Works Tests.

With the courteous co-operation of the management and, indeed, with their willing and laborious assistance, it has been found possible to carry out a complete set of tests at two representative works operating the "direct" process—the works denoted by "E" and "G" in the report for 1915. At both works, chronic purifier trouble was experienced when the plant first came under obser-vation in the autumn of 1915. Attention had then to be directed to ascertain the cause of the anomalous working of the purifiers, and it was only at a later date that a serious attempt could be made to locate and minimize the loss of ammonia. The full effect of altered procedure has not had time, therefore, to make itself fully felt; but at both works the recovery figure shows im-provement; and at both works the last working of the purifiers with the drier and matured oxide has far exceeded all previous winter records.

Works "E."

The earlier history relating to this work is given in the report for 1915:

The yield of sulphate for the year 1915, and before the cyanide washer started, was	18⅔ lbs. per ton coal.
The yield of sulphate for the half-year ended June 30, 1916, was	23* lbs.
The yield of sulphate for the half-year ended Dec. 31, 1916, was	19·4* ,,
Average yield of sulphate for the whole year, 1916	21¼* lbs.

[* This figure includes ammonia in the sludge from the cyanide washer.]

Description of Plant.

The following particulars were communicated by the manager in February, 1916, as applicable to average working conditions. During the winter months conditions had been exceptional, and the make of gas on one occasion approached 700,000 c.ft. per twenty-four hours.

Coal.—Yorkshire screened nuts:
- Maximum average coal used per twenty-four hours, December, 1915, 46 tons.
- Minimum average coal used per twenty-four hours, September, 1915, 33 tons.

Gas.—
- Maximum average make, 648,000 c.ft. per twenty-four hours = 14,100 c.ft. per ton of coal.
- Minimum average make, 427,000 c.ft. per twenty-four hours = 12,950 c.ft. per ton of coal.

Purifiers.—Four, each 24 ft. square, with three layers of oxide, 9 in. depth.
- Area of each purifier, 24 ft. by 24 ft. = 580 sq.ft. (approx).
- Total volume of oxide (four purifiers) = 5180 c.ft.
- Volume of gas passed per twenty-four hours per square foot superficies:
  - Maximum make, 1120 c.ft. (1200 c.ft. on Feb. 17, 1917).
  - Minimum make, 740 c.ft.
- Volume of oxide per 1000 c.ft. gas passed per twenty-four hours:
  - Maximum make, 8 c.ft. (7·5 c.ft. on Feb. 17, 1917).
  - Minimum make, 12·1 c.ft.

The purifiers are built on columns, and are exposed to free circulation of air, but under a roof. They are worked in sequence with upward flow of gas, and the first box is emptied when a foul test is obtained at the exit of the third.

Oxide.—Duxbury's "Lux" was in use from January, 1913, to the autumn of 1916. Fresh bog ore (42 p.ct. moisture) was then charged, and later a mixture of two-thirds fresh bog ore with one-third of spent oxide (55 p.ct. S., dry basis). Revivification is carried out on the floor of a large shed. Formerly the fouled oxide was sprinkled with lime water to correct the "sourness." This practice was at once stopped when the plant first came under observation in the autumn of 1915. The sides of the shed were then screened to keep out rain; and the oxide was more frequently turned, to promote drying. Finally, a portion of the fresh ore was dried in the boiler-house for admixture with the wetter material.

Acid Bubbler.—6 ft. square by 4 ft. high, with the usual effluent tank and lead box for circulation of liquor. Before entering the bubbler, the crude gas passes through a washer fed with ferrous sulphate, for the removal of hydrocyanic acid. The bubbler also receives ammonia from a continuous still fed with virgin liquor, and, on occasions, from a small still attached to the cyanide recovery plant. After passing through the bubbler, the crude gas traverses a long underground main (100 yards) before entering the purifiers.

Virgin Liquor Still.—A continuous still, with automatic lime feed. The vapours are partially cooled by a Liebig condenser; the condensed liquor flowing to an iron seal-pot placed above the bubbler. The exit from the seal-pot has been altered to deliver the ammoniacal liquor and the uncondensed gases to the inlet gas mains in place of the bubbler direct, to minimize the risk of local alkalinity.

Cyanide Recovery Still.—A small vertical still for removing the free ammonia from the cyanide sludge. The distillate enters the iron seal-pot named above. Formerly, priming was a source of trouble, and a highly discoloured sulphate was obtained. To cure the trouble, the gases from the still were led through a short length of iron pipe, 3 ft. 3 in. long by 10 in. diameter, placed close to the still, and with a drainage pipe sealed in the third tray to remove condensed liquor. The salt is now of excellent quality.

(*To be continued.*)

A New Purifier-House at Baltimore.—The trend of American ideas in connection with gas purification plant is illustrated in the construction of a large purifying house at Baltimore, at the works of the Consolidated Electric, Gas, Light, and Power Company, for dealing with coke-oven gas purchased in bulk. The "Baltimore Gas and Electric News" states that the new building will be 222 ft. long and 90 ft. wide, with concrete foundations, brick walls, and slate roofing, and will contain a battery of sixteen purifier boxes, each 35 ft. × 21 ft. × 12 ft. deep, and capable of containing 6000 bushels of oxide. The connections will be 30-in.

LOW-TEMPERATURE CARBONIZATION.

The United States Bureau of Mines has recently issued a paper containing the suggestion that the use of inferior coal for the manufacture of illuminating gas might be found practicable by utilizing low-temperature carbonization as an enriching process—a relatively large proportion of thin gas, such as blue water gas, being passed through the retorts and mixed with the light oil-vapours. A high-grade coal, it is pointed out, decomposes under heat, primarily into paraffin hydrocarbons, a completely altered non-volatile residue, and quite small quantities of water and carbon oxides which are first produced. Some other kinds of bituminous coal yield larger quantities of the oxygen compounds than gas coals; and such derivatives are of greater importance in industrial high-temperature carbonization, as also are the secondary reactions induced by the superheating of the hydrocarbons, than in low-temperature processes. The products of the low-temperature carbonization of a coal of the Pittsburgh type, on an industrial scale, at 800° to 900° Fahr., are 1350 to 1560 c.ft. of rich gas per ton of coal, and 2 to 2½ cwt. of oil or tar. The liquid consists of paraffins, with little or no benzene or naphthalene derivatives, and practically no free carbon. The gas will contain 6 to 7 p.ct. of unsaturated hydrocarbons, and 20 to 25 p.ct. of ethane and higher paraffins, and will therefore possess high calorific and illuminating value. The tar may be subject to distillation or to cracking processes for the production of gasoline substitutes, of which it will yield at least double the quantity obtainable by high-temperature carbonization.

AUTOMATIC CONTROL OF FURNACES.

The importance of some form of temperature control in connection with gas-fired type-metal, electrotype, and re-melting pots, is insisted on by Mr. H. E. Gilbert, in the "Gas Record" [Chicago]. Pressure regulators are an advantage, to ensure even pressure under varying supply conditions; but they do not go far enough, as they are not affected by reduction of temperature following the introduction of cold metal to replace that removed, or when starting cold, nor do they establish a constant factor, even under uniform conditions of pressure or quality of supply. Many forms of thermostatic valves have been developed, not a few being designed to replace and serve the purpose of a pressure regulator. But these do not accomplish all that is desirable, and are being rapidly replaced by a more effective type.

The point was illustrated by twenty-four hour recorder charts —"A" showing the results obtained with pressure regulators and limited movement imperfectly designed thermo-valves, and "B," those following the use of wide range properly-designed thermo-valves, on a furnace serving a linotype metal pot. Comparing the results, the addition of a given amount of cold metal caused an equal reduction of temperature in each case; but the lag before full recovery was fifteen minutes on "A" and less than one-half that period on "B." The difference would be accentuated if the necessity arose for adding a further supply of cold metal before the expiration of fifteen minutes, which would cause a second temperature drop, and a prolonged lag before recovery. In "B," however, frequent additions of cold metal could be made without such disturbance of the temperature balance. In connection with the time required to get up a working heat when starting cold, or to recover the same after a long rest, the wider movement valve permitted a more rapid heating up, with no additional risk of cracking the pot, and provided a reserve of heat at the starting time when all was cold and extra heat was required. In both cases no hand adjustments of any kind were made. "A" showed results that were but little in advance of those that could be obtained with any good make of pressure regulator, while "B" indicated quicker recovery after reduction of temperature, whether caused by adding cold metal or by a period of rest.

SULPHURIC ACID FROM ZINC ORE.

Reference was made in the editorial columns of last week's issue of the "Journal" to a paper read by Mr. H. M. Ridge (of the Ridge Roasting Furnace and Engineering Company) before the London Section of the Society of Chemical Industry, on the "Utilization of the Sulphur Contents of Zinc Ore." The particular point then in mind was that, at any rate at a quite recent date, about three-fourths of the consumption of spelter in this country was imported, but that if this quantity were all made from blende, the roasting fumes could be used to produce annually, as a remunerative operation, some 400,000 tons of 140° Twaddel acid. The author's argument is that, while sulphuric acid is now the most important raw material in the chemical industries, the cheapest source of supply is zinc ore. Germany made 540,000 tons of sulphuric acid from this source in 1913; and in 1915 the United States made 410,000 tons. But in the whole of the British Empire less than 25,000 tons was produced in 1913; and up to 1916 the position had only slightly altered.

In his paper, Mr. Ridge remarked that the main source of spelter to-day is zinc blende. Formerly it was made only from calamine, which is the carbonate of zinc. Now improved methods of concentration and of smelting have resulted in making available enormous resources of sulphide ore; so that, although the rapidly increasing consumption of spelter at one time threatened to cause a shortage of ore, there is an adequate supply of suitable concentrates to cope easily with all prospective demands. The usual method of separating the sulphur from zinc blende is to roast the ore with a sufficiency of air to form zinc oxide and sulphur dioxide. If the sulphur has to be used for technical purposes, the fumes must not be contaminated and diluted with fire gases. Some constructional difficulties were encountered in the design of muffle furnaces for this purpose. Describing and illustrating early proposals for solving the problem, the author drew attention to the fact that the first roasting of blende appears to have been done in this country. Here was explained the general design of the Ridge mechanical zinc blende furnace, in which, he said, after experiments extending over many years, the mechanical arrangements have been so far worked out that freedom from mechanical difficulties is assured, while the whole furnace is rendered quite accessible.

The sulphur dioxide given off in roasting is utilized for making sulphites, liquid SO_2, or sulphuric acid. The demand for liquid SO_2 is limited; and the main commercial use for the sulphur fumes is the manufacture of sulphuric acid, which can be carried out in lead chambers or by the contact process. In this country and in Belgium lead chamber plants have been used exclusively for making acid; and in Germany this is also the rule, though there are several contact acid plants at work as well. In America, fourteen zinc smelters use sulphuric acid; and they mainly use the contact process. Calculated as 60° B. acid, the American production from zinc blende in 1915 was 484,942 short tons; the average price realized being $8·85 per short ton. The use of the contact process for fumes from zinc ore made the biggest strides in the United States, because there the smelters are largely able to rely for their ore supplies upon the produce of one or more mines, and are not dependent upon small parcels of ore shipped from various parts of the world. In England, acid has only been made from zinc ore in three plants; and Mr. Ridge estimates that their output does not exceed 25,000 tons a year of 140° Twaddel acid, which tonnage corresponds to a production of about 10,000 tons of spelter. In 1913, some 31,290 tons of virgin spelter were made in this country, partly from calamine. It has been customary to roast the sulphide ore in the reverberating furnaces from which the fumes cannot be used, so that the sulphur is wasted and the atmosphere polluted.

The most important and serious factor for consideration here in England, declared the author, is the shortage of zinc smelting capacity in the country. Zinc ore must be treated because spelter is required; and if the work is not done here, it will be done elsewhere. Cheap sulphuric acid has always been an important factor in the chemical industries; and as before the war the cost of making 140° Twaddel acid from zinc ore fumes in this country was only between 8s. and 9s. per ton, the operation is remunerative and profitable. Unless we use the resources of the Empire, others will do it for us, and we shall be obliged to continue to look on while the foreign subsidiary industries using the acid abroad go ahead.

HEATING WHEEL TYRES BY GAS.

The special advantages secured by the use of gas tyre-heaters for the operation known to blacksmiths as "shrinking-on" wagon, automobile, or locomotive tyres or bands are claimed by Mr. Gilbert C. Shadwell, in the "American Gas Engineering Journal," to be such that the replacement of antiquated methods, like a fire of waste wood, is an easy task. The tyre need not be equally heated at all parts of the circumference, but the heat can be applied at intervals sufficient to ensure the desired degree of expansion. Forms of cabinet and table heaters are illustrated; an air blast being required in each case. The heating-up time and gas consumption will depend upon the diameter and the sectional area of the tyre.

The following are average results obtained under actual working conditions; and they might easily be improved on:

Two 48-in. tyres,	section 2 in. by ⅜ in.,	heated in	10 min.,	with	74 c.ft.
One 60-in. tyre,	„ 4 in. by 1 in.,	„	24 „	„	186 „
One 48-in. tyre,	„ 2 in. by ⅝ in.,	„	8 „	„	61 „
Two 30-in. tyres,	„ 2½ in. by ¾ in.,	„	14 „	„	97 „
One 42-in. tyre,	„ 3 in. by 1 in.,	„	13 „	„	98 „

Finger tye or short horizontal pipe sections can be used, in each case, made in short lengths to admit of building-up in circles of varying diameter to suit the size of tyre, the number in the circuit being proportioned to the diameter; and the finger burner, inclined at an angle of 60°, is recommended as satisfactory and speedy. Oven furnaces fitted with revolving tables are also used, but are not to be recommended if high efficiency and an accurately true circle is required, or if the number to be heated at one time is small. A group of burners is arranged on the bottom of the oven, and all parts of the tyre pass through the flame in succession as it revolves. The gas supply must be quite equal to the maximum requirement in all circumstances.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Determining the Gas Production Goal.

Reconsidering the points of Mr. E. W. Smith's letter in last week's issue of the "JOURNAL," the suggestion occurred that there might be a second interpretation to the passage: "Without extraneously supplied inerts, it is impossible to produce, with present methods of carbonization, a gas of 500 B.Th.U. gross from coal alone"—that by interpolating "as low as" before 500, we should have the meaning intended by Mr. Smith. This proves to be correct. The statement then confirms the experience of the South Metropolitan Gas Company. We believe that, in their case, they work with the view of keeping the inert constituents within 10 p.ct., or thereabouts; and, by so doing, with the coal used, and under their carbonizing conditions, the calorific value of their gas is maintained at round about 550 B.Th.U. gross, and this with their contribution to the benzol supply. But this does not dispose of the question as to whether manufacture, coal, transport, and other economies would not be served to the ultimate advantage of the consumer by diluting the coal gas with a cheaply made blue water gas in which the inert constituents were also kept down to (say) within 10 p.ct. The very fact that working not for make per ton but for an approximately standard composition gives a gas that will lend itself to admixture with a legitimate diluent, and probably enhance flame temperature, is a good reason for urging investigation and avoiding all dogmatism, until the whole question has been searched through and through, and from all scientific and economic aspects. Different coals, too, different results. We cannot, for instance, expect the men using Welsh coal to get the same results as men carbonizing Durham, Northumberland, and certain Yorkshire coals.

ED. G.J.

The Vagaries of Government Departments.

SIR,—In view of the recent *communique* issued by the Ministry of Munitions, calling attention to the paramount importance of meeting the increasing need for the bye-products from the carbonization of coal at gas-works, and impressing upon those possessing gas-burning appliances the desirability of using gas in preference to any other means of obtaining light, heat, and power, it will probably surprise your readers to learn that another Government department is apparently doing what they can to curtail the output.

The Inland Revenue Department in Merthyr Tydfil is about to take over for offices the Old Masonic Hall; and although it is only a short time since the premises were fitted throughout with modern gas-fittings, these are now being removed and the electric light installed. Gas lighting is also being displaced by the electric light in other Inland Revenue offices in the town.

It is I think generally acknowledged that a number of Government officials are prejudiced in favour of the electric light; but at a time of national crisis such as the present—when gas undertakings are being appealed to for an increased output of bye-products—an explanation should be demanded why unnecessary changes of the above description are being made.

JAMES E. KENSHOLE,
Engineer and General Manager, Merthyr Tydfil Gas Company.

Merthyr Tydfil, Aug. 7, 1917.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Coal.

Mr. DUNCAN MILLAR asked the President of the Board of Trade whether he was now able to state the financial arrangements which had been completed with the coal owners in connection with the State control of the coal industry.

Mr. ROBERTS, after referring to a previous reply, said there were certain matters now before the Law Officers, and as soon as these were settled a statement would be made.

Coke.

Mr. WILLIAM THORNE asked the President of the Board of Trade if he was aware that at the present time coke was delivered in loads of twenty bags, and not one ton in fifty was ever weighed, and these loads at most contained 15 or 16 cwt. for a ton. Would he consider the question of having coke weighed in the same manner and under the same conditions that coal was sold and weighed?

Mr. ROBERTS, in reply, said that coke was sometimes sold by measure and sometimes by weight; but he had no evidence that misrepresentation as to the weight or measure purporting to be sold was prevalent. As coke was capable of absorbing a considerable amount of moisture, to require it to be sold by weight would not necessarily benefit the consumer.

Creosote Oil.

Mr. WATT asked the President of the Board of Trade whether he was aware that traders were being refused the use of creosote oil in their trade; that in the case of road and pavement makers this meant complete stoppage of their business—some already having stopped work altogether; that the contractor for the road making of the Admiralty housing scheme at Gourock was prevented the use of creosote oil for the fulfilment of his contract; and whether he would take any action to prevent traders being put out of business by his Department, in view of the fact that plenty of this oil was in the country?

Sir W. EVANS, in reply, said the demand for creosote oil for fuel had made it necessary to limit its use for other purposes. The whole matter was receiving careful attention.

REGISTER OF PATENTS.

Furnaces.—No. 107,433.

DAVIS, H. N., and TWIGG, W. R., of Luton.

No. 9544; July 6, 1916.

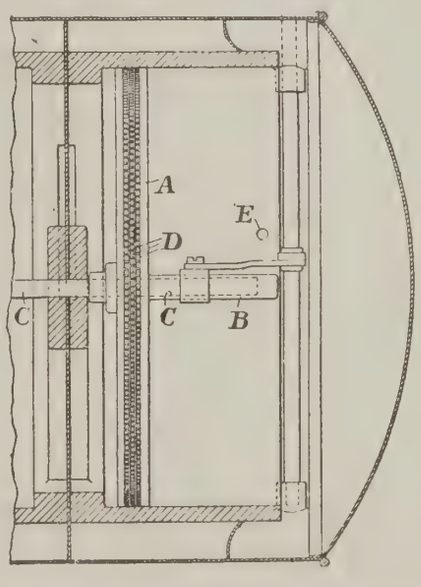
This invention relates more particularly to small gas-fired furnaces or "glory holes," in which the flame from the burner is admitted to a tapered or frustro-conical combustion chamber or fire space by way of a tangentially arranged opening—thus forming a revolving spray or annulus of flame within the chamber and tangentially around the article being heated. This flame enters the furnace at the large end of the combustion chamber and leaves by way of an outlet opening at the reduced end, so that the revolving flame has a progressive movement converging towards, and tangentially around, the article being heated.

Dry Gas-Meters.—No. 107,628.

ALEXANDER, W., and PINCHBECK, LTD., of Adams Place, Holloway, N.

No. 9304; July 3, 1916.

According to this invention, the piston of a dry gas-meter has a groove divided into cells filled with mercury, which moves to and fro with the piston over the walls of the cylinder or casing; any tendency of the mercury to move out of its groove is checked by the pressure of the gas exerted in the direction in which the piston is moving.



Alexander's (Pinchbeck's, Ltd.), Dry Gas-Meter.

The illustration shows a longitudinal section (partly in elevation) of a portion of a meter. A is the piston (in its extreme inward position) mounted on a hollow shaft B, and moving to and fro on a spindle C. The piston is provided with three grooves divided up into a large number of cells D, those in the outer grooves being staggered with regard to the cells in the central groove. To fill the grooves or cells, the cylinder has a hole E, through which mercury is poured when the grooves are opposite it—the piston being also rotated when a groove is divided into cells.

Mixing Gas and Air.—No. 107,523.

REEVES, E. A., of Milford, New Haven, U.S.A.

No. 16,824; Nov. 23, 1916.

This apparatus for mixing gas and air has for its object, among other things, to produce a device wherein the relative proportions of gas and air may be predetermined and varied, irrespective of the pressure under which either the air or gas is admitted, and, further, to so arrange the elements that differential friction between the valves and their connecting mechanisms will be eliminated, as well as any differential pressure between the air and gas diaphragms. The mechanism is arranged as to be practically automatic, and operates without the intervention of pistons, gears, and other similar devices commonly used in apparatus of the character. For purposes of illustration, the patentee assumes that the gas admitted into the apparatus is illuminating gas, delivered through the ordinary city main, with pressure varying at different times during the day. Between the apparatus and the point of consumption a suction pump is utilized to perform the double function of drawing air and gas through the apparatus and forcing it to a delivery point or point of consumption. The pump is provided with such bye-pass or automatic valves as will relieve excessive pressure and will nullify the suction action of the pump at a predetermined pressure.

The patentee claims in effect: 1.—Apparatus for mixing gas and air comprising three compartments or chambers, within each of which is a flexible diaphragm; an opening from one of the diaphragms to another of them, with an air opening into each; a rock-shaft to each diaphragm and governed thereby; a gallery or upper part divided into several chambers communicating with the compartments through valves controlling the communications, and operated by the rock-

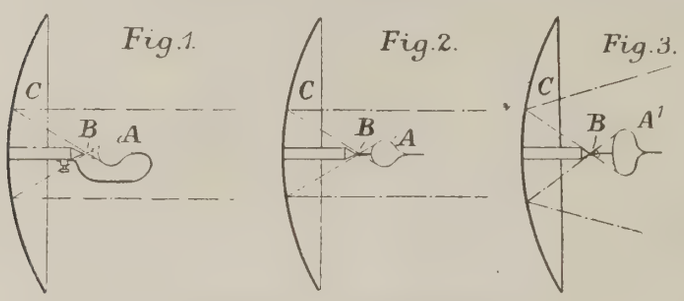
shafts, with springs to equalize pressure on two of the shafts, and a spring which exerts pressure on the diaphragm of the other shaft; and means for variably controlling the movements of the gas and air inlet valves. 2.—Two communicating diaphragms—one controlling the valves for the air and gas entering the gallery or upper part, and the other the gas and air exit valves. 3.—The combination with a body or containing member, having separate air and gas inlets and an exhaust outlet, of diaphragm actuated means for mixing in predetermined proportions the air and gas that pass through the inlets, irrespective of the relative pressure under which the air and gas enter, and delivering the mixture to the exhaust outlet, and maintaining it at the exhaust outlet in the same relative proportion. Diaphragm operated means are employed for varying the predetermined proportions, but separate and independent from the first-mentioned diaphragm means.

Lighting by Incandescence.—No. 10,776.

SEARLE, W. S., and DURAND, Sir E. L., of Noel Street, W.

No. 5385; April 12, 1916.

This invention relates to means for illumination wherein a solid body of refractory material and of ellipsoidal form is raised to a highly incandescent state when exposed to the action of an electric current or of a gaseous mixture. The incandescible body is arranged with its major axis horizontal in, but at right angles to, the focal line of a spherical circular reflector "so as to produce a beam of light which extends over a wide angle in a lateral direction, but is confined within a comparatively narrow angle altitudinally."



Searle and Durand's Diagrams.

The effect of the arrangement will be apparent from the diagrams. Fig. 1 is a vertical section and fig. 2 a horizontal section, showing a spherical pastille A mounted in front of an intense flame-jet B, in conjunction with a reflector C. The light-rays which proceed from the pastille to the reflector are projected as a substantially parallel beam; and on comparing figs. 1 and 2 together, it will be seen that the width of the beam, in the vertical and horizontal planes respectively, is equally restricted. Fig. 3 shows the same reflector, but in conjunction with a pastille A^1 of ellipsoidal form. In a vertical plane, the beam of light projected would correspond with that shown in fig. 1; but in a horizontal plane, the beam extends (as shown) over a substantially wider angle than in fig. 2.

If, when using a spherical pastille, it is desired to increase the width of the beam in a horizontal direction without diminishing its intensity, it is necessary to increase the heating power; but, by reducing the vertical angle subtended by the beam relatively to the horizontal angle, it is possible, with a given heating power and a pastille of given volume, to increase the lateral angle of distribution without loss of intensity.

Gas Heating-Stoves.—No. 107,859.

MAIN, R. B. & A. P., of Edmonton, N.

No. 11,904; Aug. 22, 1916.

This invention relates to stoves in which an auxiliary trivet and gas-burner are applied in addition to the ordinary gas-fire. It consists in combining a gas-ring or its equivalent with the ordinary trivet or fender usually fitted at the front of a gas-fire—the gas-ring receiving its supply from a separate branch attached to the stove, so as to allow of (say) a kettle being heated.

Gas-Fired Furnaces.—No. 107,876.

HALL, I., of Aston, Birmingham.

No. 13,318; Sept. 20, 1916.

This invention relates more particularly to furnaces in which a blast of air under pressure is adapted to increase the rate of combustion. Preferably a plurality of burner units are employed, as set forth in patent No. 12,695 of 1915, in which two distributing chambers supply the gas and air respectively to the mixing chambers, which terminate in the nozzles where the mixture of combustible gas and air issues for combustion.

According to the present invention, the nozzles or burner caps are arranged just outside apertures in the furnace; so that the gaseous mixture induces a supply of secondary air which "produces perfect combustion and prevents the nozzles from burning-out."

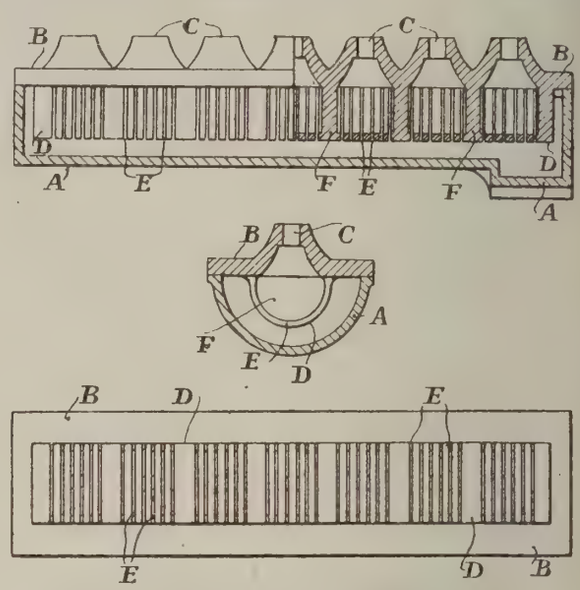
The nozzles are preferably flared or open-mouthed, and are detachably connected to the extremities of the mixing chambers. They are further, by choice, so arranged as to allow a current of air to pass freely into the aperture in the furnace; and, with this object, the aperture is larger in diameter than the exterior diameter of the nozzle. In the case of a crucible furnace, the burners are adapted to enter the furnace tangentially, so as to avoid the flame striking directly on to the crucible, and so cause erosive action.

Atmospheric Gas-Burners.—No. 107,945.

FLETCHER, RUSSELL, & CO., LTD., FLETCHER, T. W., and BANKS, W., of Warrington.

No. 4412; March 27, 1917.

These atmospheric gas-burners are of the kind described in patents No. 18,896, of 1894 and No. 25,979 of 1908, with the object of providing an improved arrangement of the slit diaphragm, which is cast with a removable nozzle cap, while the chamber thus formed is divided by partitions into a series of separate compartments, one for each nozzle.



Fletcher, Russell, and Co.'s Atmospheric Burner.

A longitudinal section of one form of a burner is given; also an underside plan of the removable nozzle cap and integral slit diaphragm, and a transverse section.

A is the body of the burner and B the nozzle cap provided with nozzles C and removably fitted to the body as usual. The cap has cast or formed integrally with it the diaphragm D, provided with saw-cuts or slits E for the passage of the gas to the nozzles. The chamber formed by the cap and diaphragm is divided by partitions F into separate compartments for the nozzles. The casting of the diaphragm with the nozzle cap is said to facilitate the manufacture and fitting of the burner, and the division of the chamber formed by the cap and diaphragm into separate compartments for the nozzles "provides a better distribution of the gaseous mixture to the nozzles."

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 9.]

Nos. 10,898—11,302.

GASOLINE CORPORATION.—"Art of distilling hydrocarbon oils." No. 11,212.

HILL, J.—"Dry gas-meters." No. 11,197.

IONIDES, A. C.—"Gaseous-fired heating-appliances." No. 10,949.

IVERS, D. See Hill. No. 11,197.

MOORE, F. W.—"Storing gases." No. 11,001.

MURPHY, S. J.—"Cylinders for storing compressed gas." No. 10,964.

NEW JERSEY ZINC COMPANY.—"Gas filtering apparatus." No. 11,048.

ROSE, J. R.—"Process of manufacturing gaseous fuel." No. 11,238.

RUDGE, H.—"Incandescent mantles." No. 10,907.

SHORT, F. C.—See Moore. No. 11,001.

WELLINGTON, S. N.—"Production of gas." No. 10,972.

WELLINGTON, S. N.—"Destructive distillation of carbonaceous substances." Nos. 10,973 and 10,974.

WILTON, N.—"Treating gases with liquids." No. 11,039.

WOOLFE, H.—"Portable gasholders." No. 11,187.

Uniform Working-Week for Manchester Gas-Workers.—The Committee on Production will sit at Old Palace Yard, Westminster, on Thursday next, to consider the advisability of establishing a uniform working-week in the Manchester Gas-Works. The Gas Department will be represented by Mr. P. M. Heath, the Deputy Town Clerk.

Grantham Gas Company.—Mr. J. G. Thompson presided at the eighty-sixth half-yearly meeting of this Company last Tuesday, when the statement of accounts, presented by the Directors, showed a balance of £4593 to the credit of the profit and loss account. Out of this sum the payment was declared of a dividend of 5 p.ct. on the consolidated stock; the balance to be carried forward. The Company, like other undertakings, had had to face a further increase in the price of coal for the current year, and a great increase also in the cost of all other materials, besides which a substantial advance in the wages of employees had had to be provided for. These increases had, however, been partly met by a considerable extra consumption of gas and increased value of residuals.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting was held last Friday, at the Cannon Street Hotel, E.C.—Mr. Charles Hunt in the chair.

The Secretary (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and statement of accounts were taken as read.

Two Important Features and a "Windfall."

The Chairman, in moving the adoption of the report, said: The report contains two announcements that, taken together, are significant of the very exceptional conditions under which the work of the Company continues to be carried on. One is that of an abnormal increase in the consumption of gas largely due to a continued scarcity of house coal, and the other of the necessity, notwithstanding this increase, for a further rise in the price of gas, making the third since the commencement of the war. In ordinary times a very much smaller increase than 17·1 p.ct. would, almost invariably, have been the signal for a reduction of price; but manufacturing costs under war conditions have, as the accounts show only too clearly, quite outstripped the additional profit that must otherwise have accrued from this very substantial increase of business. In fact, the half-year's trading shows a diminution of profit as compared with the corresponding period of last year of no less than £10,083; and but for what may almost be described as a "windfall," the amount carried forward from last half year would have had to be drawn upon to pay the very modest statutory dividend of £4 16s. 8d. p.ct. This "windfall," amounting to £5167, appears in the net revenue account as "tonnage allowance on coal deliveries during 1915-16;" and the explanation of it is that in the previous year an allowance was made to Cory and Son, Ltd., of part of the extra cost of delivery incurred by them in consequence of the outbreak of war. The following year, freights went very much against the Company; and we, in turn, asked Cory and Son, Ltd., to meet us as we had met them. This was at once agreed to by the then representative of the firm, Mr. J. C. Hamilton Greig, whose untimely death is so greatly deplored; and, after considerable though unavoidable delay, a settlement was arrived at early in the present year, as recorded in the accounts.

The Starting and Vanishing Points of the Bonus.

It is, I need hardly say, a matter of profound regret that any further advance in the price of gas should have become necessary, if only because this extinguishes the bonus to co-partners, the sliding-scale relating to which ceases to apply when the price of gas exceeds 2s. 11d. per 1000 c.ft. This scale was fixed when co-partnership—or profit-sharing as it was then called—was adopted in 1894, and has since remained unaltered. At its inception, it bore some relation to the Company's standard price for gas, inasmuch as 3s.—the mean of the neutral zone at that time in operation—was fixed as the starting-point of the bonus. But in 1906 this neutral zone was abolished, and the Company's standard price reduced by Parliament to 2s. 9d. There then ceased to be any correspondence between the standard price and the starting-point of the bonus; and were such correspondence necessary, our starting-point would have had to be reduced to 2s. 9d., with corresponding loss to co-partners. But it is, I think, abundantly clear that the main idea of the founder of our co-partnership—Sir George Livesey—was that the scale should be such as to ensure to co-partners some small share of the profit of the undertaking under all reasonable conditions. That must have been in his mind when in 1899 he explained to a Newcastle audience that the then South Metropolitan scale—the starting-point of which was 2s. 8d.—had been fixed at a figure "to allow for a possible increase of price without reducing the bonus to vanishing point." It must have been again in his mind when a few years later he raised the South Metropolitan starting-point from 2s. 8d. to 3s. 1d.—thus, it is true, bringing it into line with the Company's new and reduced standard price, but increasing the distance between the starting-point of the bonus and the vanishing-point by no less than 5d. per 1000 c.ft., although such distance was at the same time indirectly and further increased by reduction of the cost of production consequent upon the lowering of the Company's standard from 16 to 14 candles. What neither Sir George nor anyone else could possibly have foreseen was the occurrence of circumstances like the present, which have quite upset all calculations and previsions. This Company's scale would therefore call for revision in the event of any long continuance of present conditions; but in the meantime we may be certain that co-partnership will continue to fulfil its mission, regardless of any temporary suspension of bonus. We may also look forward with considerable confidence to the part which, in some form or another, it will take in the reorganization that, by all accounts, is to take place after the war.

Record Increase in Gas Consumption.

Although what was said on the snbject at the last general meeting clearly foreshadowed an appreciable increase in the gas sales for the half year, yet so large a one as that which has already been mentioned could not then have been anticipated. It is easily a record in the history of the undertaking, and seems to indicate that war conditions are hastening the transition from solid to gaseous fuel which has for some time been slowly progressing. This view is supported by an increase of no less than 15·9 p.ct. for the Midsummer quarter alone, of which a very large proportion was contributed by ordinary as distinguished from penny-in-the-slot meter consumers. It is indeed very evident that to this class of consumers the use of gas in the household makes a special appeal at the present time. But so great an expansion of business imposes on the undertaking no easy task at a time when extensions of carbonizing plant are out of the question, and all that can be done is to strengthen the existing plant and machinery by every available means.

Coal Supplies and Controller's Redistribution Scheme.

Embarrassment in this respect has been supplemented by difficulty in finding enough coal for such a large additional output within reasonable limits as to price. All the Company's supplies have lately had to be drawn from the Midland coal-fields. But it was found practically impossible to extend purchases in that direction; and it therefore became necessary to go further afield. Consequently coal is now being brought to Lower Sydenham and Bromley by rail from sources that are not contemplated in the recent scheme of the Coal Controller, the object of which is to supply customers from the nearest source, so as to save wagons and haulage. There is, however, an understanding, upon which we rely, that coal coming from any forbidden area will be exchanged for an equivalent tonnage from the area to which the customer has access under the scheme. It is therefore hoped that no serious difficulty will arise as to the continuance of this Company's supply—the bulk of which is unaffected by this redistribution scheme; it having been our practice, as regards Midland coal, to purchase from the nearest collieries. In this connection I should like to acknowledge our indebtedness to the Wandsworth and Commercial Gas Companies for having placed some of their coal at the disposal of this Company for replenishing stocks when these had become somewhat seriously depleted; and their assistance at such a time is greatly appreciated.

Electricity Deficits and the Rates.

Our protest against the action of the Beckenham Urban District Council in charging upon the rates a deficiency incurred in the working of their electricity undertaking has elicited from the Local Government Board to whom it was referred by the Council the suggestion that the Council should consider the question of raising the price of electricity. To this the Council reply that, "in their deliberate opinion, any further increase of price will have the effect of so further reducing the consumption of current as ultimately to result in an additional charge on the rates towards the support of the undertaking." It is a little difficult to reconcile this statement of the position with what was said in the local paper last April by the Chairman of the Electricity Committee—viz., that "the reduced demand for current came, however, to a stop in November. In fact, since that month there has been a decided increase over the corresponding period of 1915-16, with the result that the previous loss in units generated was fully made up." He said also that "a good many new consumers came on to our mains." Moreover, the anticipated effect of an increase of price must of necessity be largely a matter of conjecture; and it is at least possible that the preparedness of their electricity consumers to pay war prices has been under-estimated by the Council. But, be that as it may, it is, we submit, incumbent on the Council to exhaust every means in their power to make the undertaking self-supporting, if they would avoid the conclusion that it can only be run at an inevitable loss, which would raise the question as to whether any further extension of it ought to be allowed. Legislation has been specially provided with the object of securing that, so far as is reasonably practicable, the expenses of such an undertaking shall be defrayed without contribution from the rates. We had in 1913, when the undertaking was before the Board of Trade, the opportunity of asking for this legislation to be applied to it; and that we then refrained from doing so ought now, we think, to have some weight with the Council.

The Calorific Standard.

The sixth paragraph of the report records the refusal of the Board of Trade to grant, under the Gas (Standard of Calorific Power) Act, 1916, an Order to extend our existing calorific standard of 475 B.Th.U. to the remaining one-fourth of the Company's supply which continues to be governed by an illuminating power standard. It may be inferred from this, and from the fact that (to our knowledge at all events) no standard other than one of 500 B.Th.U. has been granted, that under no circumstances are the Board of Trade prepared to grant any other standard than that of 500 B.Th.U. But it by no means follows that this is the last word on the subject; and as the Board of Trade have told us that, having regard to the peculiar circumstances of our case, they are of opinion that the matter is one which should be left to the decision of Parliament, we have felt it to be necessary to thoroughly explore the position. It would serve no useful purpose to say how far our inquiries have already extended, nor would it at the present time be safe to predict any radical result either from our investigations or from those of others—for already the Institution of Gas Engineers and the Fuel Research Board are both at work on the subject. But it may safely be said that a return to pre-war conditions in their entirety is out of the question, because this would not be compatible with the fullest conservation of the nation's fuel resources, which it must henceforth be the aim of everyone to promote. The war has taught us many things; and it would be the height of unwisdom to ignore its lessons.

Inert Gases.

On the question of inert gases, which has been so much debated during the last few months, I can say that our investigations have already convinced us that the presence of these gases in the gas as delivered to the consumers, in so far as this is preventable under the ordinary conditions of carbonization, is prejudicial to both buyer and seller. Accordingly, the utmost is being done to limit their presence as much as possible; and such limitation to the greatest practicable extent will be kept steadily in view as one of the aims of the new carbonizing plant which, so far as can be foreseen, will have to be provided immediately after the war.

Features of the Accounts.

An unexpected and certainly an unwelcome addition of a not inconsiderable amount to the percentage of unaccounted-for gas is receiving the attention of the Engineer; and it is hoped the mystery attending it may be solved ere long. Apart from this the two leading features of the accounts are the largeness of the figures that have now to be dealt with, and the comparatively meagre result, notwithstanding, of the

half-year's trading—coal and oil alone cost in round figures £46,000, or 38 p.ct., more than for the corresponding period of last year, and £10,000 more than for the whole of the fateful year 1914. Much of this is due to the larger quantity of material used, while to the greater output of gas is also attributable other increases in manufacturing costs, bringing up the total increase under this heading to nearly £56,000. On the other hand, there is a very welcome reduction in the cost of distribution of, approximately, £9700, although this is largely counterbalanced by the additional cost of war bonuses, &c., which now amounts to rather more than 2½d. per 1000 c.ft. of gas sold. On the other side of the accounts, receipts for gas are more by nearly £30,000; rental of meters, stoves, &c., by about £1500; and residuals by nearly £14,000. Substantial as this latter sum may appear, the total receipts from the residual products do not amount to more than 43·4 p.ct. of the cost of coal and oil, as compared with 48·6 p ct. received in the corresponding period of last year. Some time ago I had occasion to remark on the significance of this percentage in its relation to trading profit; and here again is a reduced percentage coinciding with a considerable reduction of profit. In this instance, the smaller percentage is partly due to the higher prices that have had to be paid for coal and oil—especially the latter; and partly also to Government restrictions which have kept down prices of some residuals—notably, sulphate of ammonia—to greatly below market values. As to these restrictions, it is hard to conceive that a little more liberality would have jeopardized Government plans, while it would certainly have given great satisfaction to gas undertakers from whom so much is expected in these days, and who, together with their consumers and co-partners, continue to be heavy losers under existing conditions. We cannot at all events be accused of profiteering. However, it is something to know that at length our home-made fertilizer is finding its way in large quantities to the British farmer, whose time-honoured occupation has recently assumed a new significance.

War Items.

Reference has been frequently made to the assistance which gas undertakings have been able to render the Government in the supply of residuals—assistance which has recently been publicly acknowledged by Lord Moulton. Need I say that the Company continues to be promptly responsive to every call made by the Ministry of Munitions; everyone connected with it being keenly desirous of rendering all possible help. In this connection, it will interest you to know that 421 of the Company's employees of all grades have joined the Colours since the commencement of the war, of whom 25 have to our great regret have lost their lives, while 39 others have been wounded. One also is missing, and another is a prisoner in Germany. The care of dependants and widows continues to devolve upon the War Fund Committee—representing a fund which is the joint contribution of the Company, the Directors, and employees of all grades. To the latter, acknowledgment is due for having twice added generously to their contributions in aid of the growing needs of the fund, through the agency of which a total sum of £8012 has been distributed in allowances since the commencement of the war. I am very pleased to be able to add that one of the Company's employees (John Hampshire) has been awarded the D.C.M., and another (John Woods) the Military Medal. [Applause.]

Co-Partners and the System.

The Deputy-Chairman (Sir Fortescue Flannery, Bart., M.P.), in seconding the motion, remarked that there was nothing he wanted to add to the exceedingly comprehensive speech of the Chairman except that he wished to identify himself with what he had said about co-partnership, which was very largely upon its trial. They used to hear such statements as this: "It is all very well to have co-partnership while things are going well, and there is profit to be divided with the workers. But wait until the time comes when there is nothing to be divided, with perhaps a loss, and then see what will happen to your co-partnership." The object of co-partnership as applied to the gas business was perfectly clear. It was to give cheap gas to the consumers, good protection, and fair dividends for the stockholders, and last but not least, a share by the workers in the success of the manufacture. Unfortunately, they had not this time any share to give the workers in the success of the manufacture, because, although it was quite as successful as the circumstances would allow, it was not so commercially profitable. Hence the first to suffer, though not the only ones to suffer, were the workers in regard to their share of bonus. He wanted to say that he identified himself absolutely with the Chairman in his faith that, although co-partnership was on its trial, it would come forth triumphant. The Board believed that the workers, understanding all the circumstances (as naturally they could understand them through their daily connection with the work), appreciated that they must take the rough with the smooth, and that their confidence in the future of co-partnership and in the justice of the system and in its importance as settling ultimately in principle all the difficulties between capital and labour, was as great to-day as it was when they were receiving the bonus in the highest measure.

The Sliding-Scale in Current Circumstances.

Mr. Chas. E. Nuthall asked with regard to the sliding-scale what steps, if any, the Board had taken through the Board of Trade or the Government to get relief from the present position of affairs. It seemed to him to be unfair now that the gas industry was doing all it could to loyally help the Government that the Government should not in turn do something to relieve gas undertakings. The Government had issued 5 p.ct. War Loan and 6 p.ct. Exchequer Bonds; and these, with the conditions that had arisen under the sliding-scale, had had a baneful effect upon gas stocks and shares. The time had come when the influential gas companies should take up the matter. They ought to have a fair interest on their capital. Many people who had put their savings into gas undertakings thought they had a safe investment, which would give them at least 5 p.ct. They were not in some companies getting anything like that now under war conditions; and they had a big tax to come off what they were receiving. It might be said that this was a matter that should be left until after the war. There was nothing like beginning to try; and the Government should be approached with a protest under present conditions.

The Chairman said he thought his best reply was that the whole subject was engaging the attention of the National Gas Council, which was representative of the whole of the gas undertakings of the kingdom. Their Company could, of course, only abide by the decision of the Council; they were powerless to do anything by themselves. They could only act in unison with others.

Mr. Samuel Spencer said he took it it would be necessary to go to Parliament; if so, he supposed notice would have to be given.

The Chairman: Whatever steps are taken through the medium of the Gas Council would have to be ratified by Parliament.

The motion was unanimously carried,

Dividends.

Proposed by the Chairman, and seconded by Mr. W. G. Waller, a dividend was declared for the half year at the following rates per annum: 5 p.ct. on the preference stock, 4⅝ p.ct. on the ordinary stock, and 4⅝ p.ct. on the West Kent ordinary stock, all less income-tax.

New Auditor.

Moved by Mr. W. Richards, and seconded by Mr. A. J. Kingdon, Mr. Alfred Morland, of the firm of Messrs. Wood, Drew, & Co., Chartered Accountants, was elected an Auditor in the place of the late Mr. Samuel Wood. A letter was read from Mr. H. M. Willis announcing his intention of offering himself for election; but no one proposed his name as a candidate.

A Vote of Thanks.

The Chairman acknowledged how much the proprietors were indebted to the officers, the staff, and men for their attention to the Company's affairs and work during the half year. They were living in no ordinary times; and the work fell more heavily upon the staff than it would do under normal conditions. The Board and proprietors had every reason to be satisfied with the way in which the officers and staff had conducted the affairs of the Company.

Mr. Nuthall moved a hearty vote of thanks to the Chairman, Directors, the officers, their staffs, and the workmen. He remarked that Board and officers must have had a trying time. Difficulties had arisen which those outside the gas world knew very little about. The Directors and officers had to be constantly in touch with those exercising Government control—there were difficulties with coal and oil, and shortage of labour. They were face to face with a condition of things in regard to the management and conduct of gas undertakings such as their worthy Chairman could never have anticipated years ago. He was also sure their Engineer and Secretary had done their best in the interests of the Company.

Mr. John Randall, in seconding, said he hoped the meeting would not separate without something being said in acknowledgment of the work of the Company's men at the front. He was glad to hear that two of them had obtained distinctions. He also hoped the Directors would soon be in a position to give the co-partners a bonus again, because it would not be the desire of the proprietors that the co-partners should, through the changes that had taken place in consequence of the war, suffer the loss of bonus longer than was necessary.

The motion was cordially passed.

The Chairman, having acknowledged the vote on behalf of the Board, said it was quite their intention to do what they had done in former years in acknowledging at the usual time the presence of their men at the front. As to men who had received distinctions, they would certainly consider what should be done in regard to them when they came home. At the works and at every showroom, they had a roll of honour.

Mr. S. Y. Shoubridge, on behalf of the engineering staff and workmen, said he thanked the Chairman, the Board, and the proprietors heartily for the kind appreciation of their services. Such appreciation was especially welcome at a time when they were all taxed to the very utmost in carrying out their work. He was glad to have the opportunity of testifying to the splendid loyalty with which all those working under him had responded to the numerous calls he had had to make upon them. No words could be too great in praise of their loyalty to the Company under these exceptional conditions; and they would be glad to hear the proprietors' recognition of what they were doing.

Mr. Wastell remarked that the clerical and district staffs would be very grateful indeed at the appreciative remarks that had been passed. He could assure the proprietors that the few old members of the staff who were left—augmented by women clerks, who had been to them a sheet anchor in these times—would continue to see this thing through, come what may.

AMMONIA RECOVERY AND TAR-WORKS.

The following particulars regarding ammonia recovery and tar-works in the United Kingdom, and in Scotland separately, are extracted from the report for 1916 of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act.

Amount of Ammonia Recovered in the United Kingdom (expressed in Terms of Sulphate).

—	1916.	1915.	1914.
	Tons.	Tons.	Tons.
Gas-works	172,269	173,675	175,930
Iron-works	15,154	15,142	16,008
Shale-works	57,988	58,826	62,749
Coke-oven works	159,506	145,406	137,430
Producer-gas and carbonizing works (bone and coal)	28,786	33,218	34,295
Total	433,703	426,267	426,412

Of the above aggregate, 70,987 tons were produced in the form of concentrated ammoniacal liquor; while the balance of 362,716 tons

expressed the total of all other ammonia products (sulphate, chloride, nitrate, &c.).

The production in gas-works and shale-works shows a slight falling off from the 1915 figures. The production in iron-works may be regarded as unchanged. In producer-gas and carbonizing works, there was a marked decrease; but in coke-oven works a further increase of over 14,000 tons sufficed to make the aggregate for 1916 exceed 1915 by 7436 tons—a most satisfactory result on many considerations.

The change from the production of sulphate to the preparation of concentrated ammoniacal liquor noted in the report for 1915 continued in greater measure, and amounted at the end of the year to the considerable quantity mentioned above. It is probable that a further expansion in the quantity of this product will take place.

Tar-Works.

The number of this class of works registered was 316, as compared with 248 in 1915—a difference of 68. This large increase was almost entirely due to the rapid extension of the use of tar-dehydrating plants in gas-works. Plants designed to effect continuous distillation were very widely adopted. In some cases, however, simple plants were erected at a much more moderate cost, which gave quite satisfactory results. In several districts, plants designed upon the continuous system were not provided with sufficient condensing power. This is a serious fault, as not only did it lead to an escape of objectionable vapours, but to a loss to the country of an unknown quantity of benzol and toluol at a time when every effort should have been made to conserve these to the utmost for munition purposes.

While it may be to the interest of individual gas-works proprietors to provide small tar dehydrating plants, it is of doubtful advantage to the community to have numerous small units for treating tar put into operation without specially skilled supervision to ensure such plants being worked to their full advantage. Plants of faulty design, apart from inefficient condensation, have been put into operation which must have affected prejudicially the quantity of products obtained. In the works of experienced tar distillers, or in factories worked under skilled supervision through co-operation of a number of conveniently situated gas-works, it is unlikely that such plants would have been put into operation without modification. Combined effort with high efficiency through skilled control, will always beat individual effort with variable efficiency, and often devoid of specialized control.

The means in use for preventing escape of noxious gases underwent no change. Apart from the temporary undue escape of vapours of volatile hydrocarbons due to insufficient condensing plant, these works were conducted satisfactorily as regards the requirements of the Act.

Quantity of Tar Operated on in the United Kingdom.

	Tons.
Tar distilled in—	
Gas-works	1,420,867
Other works	138,552
Pitch produced in—	
Gas-works	715,051
Other works	83,690

Figures for Scotland.

The following statistics regarding the quantities of raw materials used, or products obtained, have been compiled:

	Tons.	1916. Tons.	1915. Tons.
Salts of ammonia (expressed as sulphate)—			
Gas-works	21,365		
Iron-works	14,310		
Shale-works	57,988		
Bone, producer gas, coke, and carbonizing works	21,030		
		114,693	118,178
Tar distilled—			
Gas and coke oven works	139,197		
Other works	126,285		
		265,482	285,101
Pitch produced—			
Gas and coke oven works	70,879		
Other works	75,274		
		146,153	143,011

Of the above total quantity of sulphate of ammonia, the equivalent of 7246 tons was manufactured as concentrated ammoniacal liquor; the balance of 107,447 tons consisted of other ammonia products (sulphate, chloride, nitrate, &c.).

The liquor distilled from gas-works was equivalent to 21,365 tons of ammonium sulphate; and the noxious gases were destroyed as follows: In oxide of iron purifiers, 72 p.ct.; by combustion, 16 p.ct.; by Claus process, 11 p.ct.; by precipitation by metallic salts, 1 p.ct. In a few cases, oxide purifiers were found to be foul; but there was little cause for serious complaint. At one works, the stock of oxide was renewed after 14 years' continuous service. During this long period it largely increased in bulk and value. It was necessary to use exceptional means to maintain its vigour.

Mr. E. L. Oughton (not Ongleton) should have been named in the "Journal" for July 31 as having taken part in the reception of the members of the Yorkshire Junior Gas Association at the Longwood Gas-Works the previous week.

At the last meeting of the Blackpool Town Council, recommendations by the Gas Committee that the salary of Mr. William Chew (the Gas Engineer) be increased by £100 a year, and that of Mr. John Chew (the Assistant-Manager) by £50 a year, were approved.

Mr. A. E. Mottram, the Manager of the Ossett Corporation Gas-Works, reported to the Gas Committee that he had received intimation that a certain amount of dissatisfaction was arising in the Committee as to his connection with the Advisory Committee and Volunteer Training Corps; and he asked for their instructions on the matter. After consideration, it was resolved—"That the Committee are quite satisfied that the Manager has not neglected his duties at the gas-works, and desire him to continue his duties in connection with both the bodies mentioned."

CAMBRIDGE GAS COMPANY.

The Half-Yearly Meeting of the Cambridge University and Town Gas Company last Tuesday was presided over by the Chairman (Mr. E. H. Parker), who, in moving the adoption of the report and accounts for the half year ended June 30, said the balance of revenue carried to the profit and loss account was £7468; and considering the conditions under which the Company had been working, the Directors thought the shareholders could be congratulated upon the result. Sufficient profit had been made to enable maximum dividends to be paid, notwithstanding the increase in the price of coal and of all materials, besides a considerable rise in the cost of labour. This result was the more satisfactory as the Directors last June reduced the price of gas 2d. per 1000 c.ft. It might be necessary to increase the price again in the near future; but every effort was being made to prevent any increase being necessary. The shareholders would like to know that, though a large number of houses had been shut up, and though there was a great restriction in public lighting, the Company were to-day making more gas than in any other period of their history. The Directors wished to convey to Mr. J. W. Auchterlonie (the Engineer) and to the whole staff, and to all the employees of the Company, their appreciation of the loyal support they were receiving in these difficult days. To Mr. Auchterlonie's skill, energy, and resource they were greatly indebted. In view of the paramount importance at the present time of obtaining bye products in the greatest quantities from the carbonization of coal, the Directors wished to urge upon the public the desirability of using gas in preference to any other means of obtaining heat, light, and power. The motto at the present time should be, "Use gas in all cases where possible, but use it economically." The Ministry of Munitions were persistently urging gas companies to carbonize as much coal as possible, and to do so immediately. Alderman Stace seconded the motion, and said the Company were to be congratulated in these difficult times on making as much progress as they had during the past year, and presenting such a satisfactory balance-sheet. He was sure what the Chairman had said about Mr. Auchterlonie was appreciated by all. The report was adopted, and the maximum dividend declared.

ALDERSHOT GAS AND LIGHTING COMPANY.

Mr. R. W. Edwards Appointed Managing-Director.

At the Half-Yearly Meeting of the Aldershot Gas, Water, and District Lighting Company, the report published in the "Journal" for July 24 [p. 167] was unanimously adopted. The Chairman (Mr. W. T. Robertson, J.P.), on rising, said that he wished to refer to a personal matter—the much regretted death of their very old friend, Mr. A. F. Wilson. Many of those present knew him personally, and all deplored his loss. In the period under review, the supply of gas had been excellent; the sales showed an increase of 10¼ p.ct. This was partly due to the extra claims made upon them by the military authorities, and partly to the continual demands for gas for cooking purposes. In the matter of coal, the Company were peculiarly situated; for they came into the London area, and so had to derive their supplies from a distance. For thirty or forty years they had taken a large portion of their coal from the West Country, and outside their own area. They had had some 30,000 or 40,000 tons from collieries there; but by the new scheme they were excluded from getting their coal from this district. They were to be thrown into the world of competition, and obtain their supplies from the northern area supplying London. It was an upheaval in their business; and the result would not be known for a few weeks. They had not quite reached a full-stop; and they believed that it might be possible to obtain supplies elsewhere. But at what price or in what quantities he was unable at present to say. They had, however, a certain assurance that they would get all the coal they required. Then there was the question of the supply of oil, which was receiving careful attention. To such companies as themselves, the supply of oil was practically suspended. Fortunately, however, they had on hand a considerable stock, enough to help them over the coming winter months.

They would see from the report, continued the Chairman, that the vacancy created on the Board by the death of Mr. Wilson would be filled by the appointment of Mr. R. W. Edwards to the position of Managing-Director; and he felt quite sure the stockholders would thoroughly approve of this appointment. Mr. Edwards joined the Company nineteen years ago, and shortly after he himself became a Director. They occupied small offices then; and they did their work indifferently well. Mr. Edwards was a considerable shareholder in the Company. He liked a man who was prepared to back his belief. Mr. Edwards knew that their undertaking was a good thing to be in, and he knew what it could do; and so he put his money into it. He had various qualifications; and in securing him as Managing-Director, the Board would also be securing the progress of the Company. Though Mr. Edwards would now be resigning the office of General Manager, he would devote the same amount of time and care that he had always done to the management of the Company's affairs.

A resolution was cordially passed increasing the remuneration of the Directors from £1200 to £1800 per annum.

Mr. Edwards, replying to a vote of thanks to the staff, sketched his own connection with the Company, and said how he had seen it progress through its parliamentary struggles, trials, and obstructions; and he also paid a well-deserved compliment to the broad-minded and tolerant attitude and deep sympathy and appreciation of what was being done by Mr. Robertson, whose years of chairmanship to him (the speaker) had been years of real pleasure.

The Huntly Gas Company, at their annual meeting, declared a dividend of 7½ p.ct. and carried £453 forward to next account. The charges for coal, meters, insurance, and taxes are £253 in excess of last year. At the annual meeting of the Crieff Gas Company, a dividend of 7½ p.ct. was declared. The price of gas is raised from 4s. 4½d. to 4s. 7d. per 1000 c.ft.

ST. HELENS GAS ENGINEERSHIP.

Mr. Samuel Glover's Offer to the Committee.

At a Meeting of the St. Helens Gas Committee, it was reported that the Gas Engineer (Mr. Samuel Glover) would be entitled to retire on a superannuation allowance on Oct. 15, but that the Chairman had ascertained that Mr. Glover was prepared to consider the possibility of staying on if the Committee desired to retain his services on the terms of his present appointment. It was resolved that the Committee place on record their appreciation of the valuable services which Mr. Glover has rendered to the Corporation as Gas Engineer, and that the Parliamentary Committee be recommended to retain his services accordingly. When the minutes containing this recommendation came before the Council, they were adopted.

Alderman CROOKS, when submitting the minutes of the Committee to the Council, drew attention to the statement made with regard to Mr. Glover. He said he was sure the Council would appreciate the generous course Mr. Glover had taken. He had given 45 years' valued and efficient service to the Corporation.

Alderman BISHOP seconded, and said he would like to add his word of appreciation of what the Chairman had said. He had known Mr. Glover for the greater part of the 45 years he had been in their service; and the Corporation had every reason to be proud of the way in which he had conducted the affairs of the Gas Committee during that time. They were very glad to see that he was able to stay with them, though his time for superannuation had arrived.

Mr. ELLISON added his appreciation of Mr. Glover, and expressed pleasure that in this mercenary age they had someone who would help them out of a difficulty without asking for further remuneration.

Mr. WARING also added a few words in support of what had been said about Mr. Glover's services to the Corporation. He had always looked upon Mr. Glover as a very good man.

PORTSEA ISLAND GAS COMPANY.

A Further Increase of Eightpence.

Some of the South-coast gas undertakings have suffered severely in respect of the supply and price of materials delivered. The Portsea Island Gas Company is one of them. The Directors in their half-yearly report informed the proprietors that, so far as can be ascertained from the records available, the financial result of the half-year's working is unique in the Company's history. The abnormal increase in the cost of all materials—especially coal and oil—and the general advance in wages have not only entirely absorbed the customary profits, but occasioned an actual loss of no less than £12,723. This result was clearly foreseen by the Directors; but it was decided, in the interests of both the consumers and the shareholders, to trench upon the reserves before again increasing the price of gas. Since the commencement of the war the carry-forward and the reserve fund have been depleted by an aggregate of £52,426. The amount withdrawn from the reserve fund provides for a dividend for the half year at the statutory rates—viz., 12 p.ct. per annum on the "A" and "B" shares, 11 p.ct. per annum on the "C" shares, and 9 p.ct. per annum on the "D" and "E" shares, and 5 p.ct. per annum on the 5 p.ct. (maximum) stock. In order to meet the higher cost of production, it has been necessary to further increase the price of gas by 8d. per 1000 c.ft. from the June quarter. This will reduce the statutory rate of dividend on all classes of shares by a further 2 p.ct. per annum for the period for which the increase in price is continued. Notwithstanding the suspension of building operations, the number of consumers and also of appliances supplied on hire, has again increased; and the quantity of gas sold was greater than during the corresponding six months of last year. From the accounts it is seen that the quantity of gas sold amounted to 745,407,300 c.ft. as against 721,550,000 c.ft. in the corresponding period of 1916. The Directors mention that an Order for the substitution of a calorific power standard of the gas supplied in place of the illuminating power standard has been granted by the Board of Trade, and came into operation on March 1 last.

STOCKPORT CORPORATION GAS-WORKERS' WAGES.

Award of the Arbitrator.

Brief reference was made in the "JOURNAL" last week [p. 242] to the unsatisfactory attitude adopted by some of the employees at the Stockport Gas-Works (chiefly stokers) throwing up their jobs without notice, after the Arbitrator (Judge Willis, K.C.) had given his award on the question of wages.

The text of the award is now available for publication; one or two doubtful points having been brought to the attention of the Arbitrator by Mr. S. Meunier, the Engineer of the works, and elucidated.

Judge Willis observes that, before the outbreak of war, negotiations had been pending between the Municipal Employees Association and the Corporation for the purpose of levelling-up the rates of pay of the employees to the rates paid by corporations in other and comparable areas. Investigations were made for this purpose; and at the end of 1915 various increases in the rates of pay were made and were confirmed by an award which followed [see "JOURNAL" for Jan. 11, 1916, p. 99]. Those increases, says the Arbitrator, were not occasioned by the war, and, in his opinion, ought not to be taken into account in determining the matters involved in the present inquiry. Since the levelling-up of wages at the end of 1915, increases in rates of pay had been made in three or four cases, and a system of bonuses had been introduced. The whole of these bonuses and extra payments are now abolished by the terms of the new award; the following being the scale as and from April 25 last:

1.—For all adult male time workers whose wages for a full normal week do not exceed 30s., a bonus of 12s. per full working week.
Do., do., 30s. to 35s. ,, ,, ,, 10s. ,, ,,
Do., do., 35s. to 40s. ,, ,, ,, 8s. ,, ,,
Exceeding 40s. ,, ,, ,, 6s. ,, ,,
[Male time workers under 21 years of age, and female time workers shall receive per full working week a bonus equal to half the appropriate rates in the above scale.]

Certain differences arose at this stage out of the application of the foregoing award to the stokers, and some of them struck work [see "JOURNAL," June 19, p. 595]. On June 20, Judge Willis held an inquiry into the matter; and after personal interviews with the several sections of the men and the Engineer, he found that the differences arose from the fact that certain sections of men were working under special conditions as to hours and rates of payment which had not been disclosed or explained at the hearing previous to the original award.

"For instance," says the Arbitrator, "the hydraulic main attendants, sump-hole attendants, and oilers and greasers: These men work on an average over 81 hours per week. It is their ordinary week in the sense that they work it regularly—viz., for 72 hours one week and for 89½ hours the next. For 53 hours they are paid single-time rates, and beyond that time-and-a-quarter, and time-and-a-half for Sundays. The hours worked are too long, and the men never have a free Sunday. A system of shifts such as obtains among stokers would appear to be a desirable improvement."

The question which arose in connection with these men was whether their ordinary week was one of 81 hours or 53 hours—if the former, the men would receive the lowest rate of bonus and be put at a disadvantage, because they have to work longer hours and more continuously than other employees. Three or four other sections of men also presented special features and difficulties, as a result of which a supplemental award was issued revoking certain portions of the original award, and substituting the following:

2.—In applying the scale of bonus, the words full normal week shall be taken to mean a full week of ordinary or standard working hours or shifts, exclusive of Sundays and all overtime, and exclusive also of extra hours for which a special rate higher than the normal rate is paid.

3.—A deduction of one-sixth of the weekly bonus shall be made for any day (including Sunday if the workman is legitimately required to work that day) upon which time is lost by the workman, unless such loss of time is due to sickness or other circumstances beyond his control, &c., &c.

4.—A bonus at the rate of 1½d. per wagon shall be paid for the unloading of coal-wagons. When two or more men are jointly engaged, the money shall be divided equally.

5.—In the application of the bonus scale to purifier men, who are paid partly by contract or piecework and partly by time-work, their wages for a full normal week shall be their total earnings for the week, exclusive of Sundays and overtime.

At a recent meeting of the Gas Committee, the Engineer reported that a copy of the award had been sent to the Ministry of Munitions (Manchester District), and that it had been read to the men by a representative of the Ministry (Mr. Hadfield). The stokers, however, had expressed dissatisfaction with the award, and demanded a six-day week (48 hours), 12s. weekly bonus, with 2s. additional bonus for Sunday, and all previous bonus payments from last pay-day in February [the original date of claim] to be made up to 12s. weekly. With regard to the long hours worked by the hydraulic men, these were fixed, Mr. Meunier reported, at the request of the men themselves. Originally, they had worked eight-hour shifts.

As pointed out by Mr. T. Winter, J.P., the Chairman of the Gas Committee, at the last meeting of the Council, the award (including increased wages) makes a difference to the undertaking of something like £10,000 a year—a 6d. increase in the price of gas realizing about £14,000.

Knowing how earnestly Mr. Meunier spoke to the members of the Manchester District Institution recently on the question of industrial unrest, his professional brethren will doubtless now wish him a happy issue out of all his afflictions.

MANCHESTER GAS IN THE STOCKPORT AREA.

Another Request from the Ministry of Munitions.

In the "JOURNAL" for July 10 (p. 74) appeared particulars of a request from the Ministry of Munitions to the Stockport Corporation Gas Committee with reference to the supply of Manchester gas to a firm in the area belonging to Stockport. While the Stockport authorities had every confidence in their ability to supply the demand themselves (providing they had the necessary labour), they yielded to the request of the Ministry. But, in order to safeguard themselves, they laid down the principle that whatever gas might be supplied to the firm from the Manchester mains it should go through, and be registered by, a meter and charged to the Stockport Corporation, who would re-invoice the amount to their consumer.

At the last meeting of the Stockport Corporation, another request of a similar nature was reported. The minutes of the Gas Committee (subsequently confirmed by the Council) showed that a large firm of gas-power users in the Burnage district—on the Manchester and Stockport boundaries—had applied to Mr. Frederick A. Price, the Superintendent of the Manchester Corporation Gas Department, for an augmentation of the supply of gas to their works; and that letters had been received by Mr. S. Meunier, the Engineer and Manager of the Stockport undertaking, from the Ministry of Munitions and from the Manchester and District Armaments Output Committee, pointing out the extreme importance of keeping the works in question fully employed in turning out munitions. The Committee, having fully gone into the matter with the Engineer, concluded that, so far as they were aware, there was no reason to think that Stockport could not continue to supply the whole

of the gas required by the firm; and they decided to interview the Manchester authorities on the matter. Before, however, this conference could take place, a further communication was received from the Ministry of Munitions on the subject, from which it appeared that the additional supply was urgently required for the canteen and the rust-proofing plant at the works, but was only asked for as a stand-by in case of any deficiency in the supply of gas from Stockport. The Gas Committee thereupon authorized the Town Clerk (Mr. Walter Hyde) to ask the Ministry of Munitions for a proviso that all gas supplied by Manchester to the Burnage firm should be invoiced to the Stockport Corporation; and to receive a deputation consisting of the Chairman (Mr. Jacob Winter, J.P.), the Deputy-Chairman, and the Engineer upon the whole subject.

A day or two later the Stockport deputation interviewed both the Ministry of Munitions and the Manchester Gas Committee upon the subject, and satisfactorily concluded negotiations for the stand-by supply of Manchester gas to the works referred to, on condition that it should be invoiced to Stockport and not to the consumer direct.

AIRDRIE CORPORATION GAS UNDERTAKING.

The annual report by Mr. J. W. M'Lusky (since appointed to Blackburn), as Engineer and Manager of the Airdrie Corporation Gas-Works, shows that for the year 1916-17 the quantity of gas manufactured was 116,533,000 c.ft., as against 117,075,000 c.ft. the preceding year, or a decrease of 0·46 p.ct. The coal carbonized to produce the quantity of gas referred to amounted to 9972 tons, as compared with 10,196 tons for the previous year, a decrease of 224 tons. The quantity of gas made per ton of coal carbonized was 11,686 c.ft., as against 11,482 c.ft., an increase of 204 c.ft. per ton. There was an increase of 526,570 c.ft. in the gas sold, or 0·51 p.ct. Ordinary meters showed a decrease of 5·88 p.ct. compared with the previous year, and prepayment meters an increase of 8·66 p.ct. There was an increase in the industrial meters consumption of 18·2 p.ct.; while street-lamps showed a decrease of 90·99 p.ct., as against the previous year. Unaccounted-for gas was 6,423,000 c.ft., or 5·8 p.ct., as compared with 6·35 p.ct. for the preceding year, being a saving of 1,017,000 c.ft.

The total revenue of the undertaking, as shown in the revenue account, amounted to £25,783, an increase of £2090 as against the previous year. Of this sum, there was an increase of £354 from gas sales, and the remainder from residual products. The revenue from the gas-fitting business was £540, an increase of £231.

The gross income from residuals and bye-products totalled £7126, compared with £5609 for the previous year; the net income, deducting expenses of manufacture and handling, amounting to £6212, compared with £4860. This gave a return of 12s. 5s·51d. per ton of coal carbonized, making the net cost of coal 6s. 2·39d. per ton delivered at the works, against 5s. 8·25d. last year.

On the total expenditure under revenue account, there was an increase of £2296; while there was an increase under the heading of manufacture of gas of £2274, owing to the higher price of coal and all-round rise in wages. Distribution cost £934, a decrease of £346.

The Committee decided to use a portion of this year's surplus in wiping-out such outstanding accounts as were irrecoverable. The total expenditure under revenue account was £18,261, which sum, deducted from the revenue, left a surplus balance of £7522 to be carried to the credit of net revenue account to meet the annual standing charges. The total expenditure under the net revenue account was £6450, being an increase of £203, to which fell to be added last year's deficit balance of £38. At credit of this account there was £7522, as against a total expenditure (with deficit balance) of £6488, leaving a credit balance of £1033 to be carried forward to next year.

Mr. Goldie (the Convener), in presenting the estimates for 1917-18 at the Town Council meeting, said the Committee were assuming that they would sell as much gas as last year, and obtain about the same return from residuals. By continuing the current rates for gas and coke, they estimated to finish the year with a deficit balance of about £700. However, against this sum they commenced the year with a credit balance of slightly over £1000. In these circumstances, no alteration would be required in the price now charged for gas.

WOOD DISTILLATION IN CANADA.

A paper on this subject was recently read before the Canadian Society of Civil Engineers by Mr. John S. Bates, the Superintendent of the Forest Products Laboratories of Canada. The author pointed out that the destructive distillation of hardwoods is the only important distillation industry in Canada where wood is used as raw material. There are now eleven plants in Ontario and Quebec, and the industry is well organized. Manufacture is carried beyond the stage of the crude products, where so many of Canada's industrial activities cease; and the specially refined and derived products are produced in Canada for local and export trade.

In the limited list of chemicals which are regularly exported from Canada, there are only three of much importance—calcium carbide, acetate of lime, and methyl alcohol, the last two of which are entirely produced by hardwood distillation. The Canadian plants together consume more than 500 cords of wood per day. The primary distillation process is rather crude—the cordwood sticks being run into retorts (on cars) heated externally by fire which is controlled to some extent. The crude decomposition products which are driven off go through a series of refining operations for the separation and purification of the valuable products.

Hardwood charcoal is one valuable product, mainly used as household fuel and for the manufacture of charcoal iron. The wood gas is of rather low heating value, and is burned under the retorts. The hardwood tar is also used as fuel at the plant in most cases, as the constituents have not the inherent value of coal tar. However, the recovery of certain bye-products has important possibilities. The various creosote oils obtained in the course of separating the wood alcohol and the acetic acid from the tar are at present of minor value.

The destructive distillation of resinous woods is a very different proposition, and aims mainly at the recovery of turpentine, pine oil, and pine-tar oil, together with softwood charcoal. The wood is destructively distilled in retorts designed somewhat differently from hardwood retorts, in order to give better temperature control. The yields of methyl alcohol and acetate of lime are much smaller than in the case of hardwoods, and by present methods recovery has not been found profitable. Experiments have indicated that the resinous stumps of western yellow pine in British Columbia compare very favourably with southern pine in yields of distillation products; and the old red pine stumps of Ontario contain a good deal of resin and some turpentine. When the industry becomes more highly developed, it will no doubt be established at certain points in Canada.

In Canada wood waste occurs in such large quantities, and is so easily used as fuel directly under steam-boilers, that there is not so much occasion for installing the more complicated large-scale gas producers. In line with the manufacture of producer gas, it is important to mention the destructive distillation of wood waste modified to yield the maximum amount of wood gas. A number of centres in America are now using wood gas for heating and illuminating purposes and as motor fuel. The steam and solvent process applies to resinous long-leaf pine in the Southern States. The selected wood waste is hogged or chipped; steamed to drive off most of the turpentine and pine oil; and then extracted with gasoline or other volatile solvent for the recovery of resin. The resinous wood material in Canada is limited in quantity and not very high in quality; so that the economic recovery of products is a more difficult problem.

THE INDUSTRIAL SALES DEPARTMENT.

A Suggested Improvement.

The term "Sales Engineer" has been adopted the last few years, writes Mr. G. D. Grain, in the "Gas Record" [Chicago] to indicate a very important official whose duties include not only soliciting new business, but the solution of the numerous and varied technical problems in connection therewith. He needs to be exceedingly versatile; and it is rare to find the capabilities of a competent salesman combined in one individual with those of an expert investigator. The salesman must, above all things, be enthusiastic; but the investigator needs to be calm and judicial. If the first predominates, the individual may go further than is warranted by technical facts, and the careful student may be lacking in the push that is essential to successful selling. The first would be attracted by a list of live prospects; the second, towards problems that were interesting from a chemical or scientific view, rather than their sales value. He might find himself up-against a tough problem that must be tackled without delay, and occupy his entire attention for some days, at a time when several contracts, under favourable conditions calling for no special investigation, are to be had for the mere asking.

These considerations have led many gas men to ask whether such combination of duties is the best arrangement. If the salesman also takes full care of all incidental technical problems, it makes for smooth running and less trouble at the office; but it is not an ideal plan for getting the best returns out of the possibilities of the situation, or from the standpoint of business producing power. The industrial field might be divided along certain lines, with a home engineer in charge of each section who would take care of all industrial technical problems arising in connection with it, and prepare such information as might be required by the men engaged exclusively in selling. This need not mean a separation of sales and technical work, or that one department would not be interested in the other, but would provide effective concentration and team work that would meet the objection mentioned.

Lyttelton (N.Z.) Gas Supply.

Mr. W. M'Auliffe, the Engineer and Manager of the Lyttelton (N.Z.) Gas-Works, in his report dealing with the twelve months ended March 31, says there has been a considerable reduction in the sale of gas by meter. The decline is owing largely to changes in one of the Government institutions, and to some extent to the introduction into the borough of electrical energy. Owing to disorganization in the coal trade and shipping, the supply of coal has been very erratic. At times, too, the coal has been of a very inferior class for gas production; the average make for the year being 798 c.ft. per ton of coal less than in the previous year. Inferior coal has also resulted in inferior coke; and there has been used over 40 p.ct. more coke in the furnaces. One bed of retorts has been let-down after working continuously for upwards of eleven years. The quantity of gas made in the twelve months was 16,078,000 c.ft., or 11,883 c.ft. per ton of coal carbonized. The proportion unaccounted-for was 4·29 p.ct. As the profit on the working is only £347, the transfer of £500 to the sinking fund leaves the profit and loss account in debit on the year's operations.

Losses at Accrington.—At the monthly meeting of the Accrington Gas and Water Board last week-end, the principal subject considered was the report and accounts for the past year which showed considerable losses [see *ante*, p. 209] on the gas undertaking. The Treasurer submitted a statement indicating where increased revenue would be obtained during the coming year, owing to better prices for residuals, and also pointing out where certain economies could be effected. The result of this statement was that the Board decided that there should be no increase of charges for gas during the current year. It was clearly understood, however, that unless there is an improvement in the financial operations of the Board, increased charges in the future will be inevitable.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Aug.* 13.

Pitch continues firm, and there is a considerable amount of inquiry from various directions for export. The price is not below 45s. per ton net in bulk f.o.b. makers' works. Other prices are steady as follows: Creosote 4¼d. to 4½d. per gallon, in bulk. Solvent naphtha, 2s. 2d. to 2s. 3d. per gallon, naked. Anthracene, 48-50 p.ct., 6d. per unit, casks free all at makers' works net cash.

A steady amount of business is being done in sulphate of ammonia for home agricultural use, on the Government terms.

Tar Products in the Provinces.

Aug. 13.

The average values for gas-works products during the week were: Gas-works coal tar, 22s. 6d. to 27s. Pitch, East Coast, 16s. to 20s. per ton; West Coast—Manchester 14s., Liverpool 15s., Clyde 18s. nominal. Benzol, 90 p.ct. North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6⅝d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3½d. to 3⅝d. Heavy oils, in bulk, North, 3⅝d. to 4½d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Although the general condition of London and Provincial markets remains about the same, rather more activity in pitch is to be noted—as much as 45s. being quoted in London for next season's shipment. Provincial prices are harder, at 17s. to 19s., in sympathy with London. This is a movement which is likely to be continued; although it is said that shipping charges are so high that these, together with the carriage, swallow-up all the difference. One thing, however, is certain—that there is a very big demand for export, if only it could be got at. The knowledge of this fact makes holders reluctant to part with pitch at current provincial rates; and meantime, of course, stock is accumulating in the North. Solvent naphtha keeps firm; the demand being steady and well up to output. Sellers are now asking 2s. per gallon. Heavy naphtha is rather quieter, at 1s. 5d. per gallon. The naphthalenes are also in good request—both crude and refined. A much larger shipping business for the latter would no doubt be put through if the licence system were suspended for a time; for however freely licences may be granted, the system causes delays, and is a great hindrance to business. Crude naphthalene continues to sell well at the usual wide range of prices. Common sorts may be obtained at 90s. per ton; but for some finer qualities as much as £14 is asked and obtained. Creosote is practically off the market, and prices are most uncertain; there being rumours as to further restrictions in this connection. It is understood that no fresh sales may be made without official sanction; though delivery may be made against existing contracts. The creosote must not, however, in such cases, be used for prohibited purposes. An awkward point arises here for those who have, for instance, contracted to take creosote for the purpose of creosoting timber. In such cases, presumably, the Government will either give special permission or take over the creosote from the buyer. Aniline oil (pure) is quiet, and is quoted 1s. 3d. to 1s. 4d. per lb. Other quotations for coal-tar products are as follows:

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 25s., Midlands 23s., North 23s. 6d. per ton, *ex* works.

Pitch: East Coast, 17s. to 18s. f.o.b.; West Coast—Liverpool and Manchester 17s. 6d. to 18s. 6d. f.a.s., Clyde 18s. to 19s. per ton.

Solvent Naphtha: Naked London 90-190 % 1s. 4d. to 1s. 5d.; North 1s. 2d. to 1s. 3d. per gallon; 90-160 % naked London 2s. 2d. to 2s. 3d.; North 1s. 8d. to 1s. 9d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8½d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3⅞d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95 %, 2s. 6d.; 97-99 %, 2s. 8d.—2s. 9d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton.

Sulphate of Ammonia.

Advantage is being taken of the cheaper prices up to September. The bulk of the production of this country is going on to our own land, and producers are still concerned as to whether they themselves can make a living at the fixed maximum prices arranged by the Government. It is pointed out that while the position of the agriculturist under the Corn Production Bill is highly satisfactory, and more so if the increased yield due to the extension in the use of artificial fertilizers is taken into account, the position is quite the reverse from the maker's point of view; for he is compelled to accept what is in reality a pre-war value, notwithstanding the greatly increased production charges, in addition to which the changed conditions of sale are less favourable than those hitherto existing. Strenuous efforts are being made to remedy this state of affairs, and to bring about a more equitable basis of valuation. Increased production and more simplified organization are also being suggested in some quarters, with a view to the saving of expenses that are needless.

Export business is still reduced to very small dimensions, and the price appears to vary between £22 10s. and £23 per ton. There is, unfortunately, reason to anticipate a permanent loss of export trade as a direct result of current restrictions here. Norway, for example, is taking steps to very largely increase the output of cyanamide; and as regards Japan, the imports of sulphate from Great Britain, which formed one of the principal lines of business between the two countries before the war, has been seriously interfered with—having fallen from 108,000 tons in 1913 to about 3000 tons last year. The domestic supply of sulphate in Japan last year was 37,600 tons, and the estimated output for 1917 is 50,000 tons—less than half the imports of 1914.

There are in contemplation three new factories for the production of calcium cyanamide; and practically the whole Japanese production of it since the war is being converted into sulphate of ammonia. It is quite likely that these projects may lead to competition in the Far Eastern trade generally. Other valuable fields also are utilizing competitive fertilizers, owing to the difficulty of obtaining sulphate; and makers here are, consequently, looking to the home trade for a considerably increased demand after the war.

Across the Atlantic prices are steadily advancing; and there appears to be every reason why the advance should continue. The domestic market there is well sold up; and the Americans do not look favourably upon the chances of getting any substantial supplies from abroad. Large producers are, as far as possible, taking care of their regular trade, and only accepting outside business after all the requirements of their regular customers are satisfied. They absolutely refuse long-term contracts; and it is practically impossible to get quotations there for delivery later than the current month.

Quotations: Home trade, £15 7s. 6d. to £16 2s. 6d. per ton; export, £22 10s.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is a little more active, with business rather better for forward delivery. In the steam coal trade, the demand is steady for best kinds, with prices maintained. For best Northumbrian steams, 30s. per ton is the current quotation. Second-class descriptions are quiet at about 25s. 6d. to 27s., and steam smalls are in good supply at from 18s. 6d. to 20s. 6d. Some Scandinavian contracts for about 36,000 tons have been concluded for delivery in the autumn, at near the figures stated. In the gas coal trade, the demand shows signs of improvement, and the deliveries are fairly maintained. Best Durham gas coals are 25s. per ton f.o.b.; second-class varieties are near 23s. 6d.; and "Wear specials" vary from 28s. 6d. to 30s. Freights on coal are shown by from 15s. to 16s., Tyne to London, for gas supplies; while for the foreign ports the rates are relatively much higher. Even at the higher rates, a better inquiry for gas coals is now apparently setting in for Continental ports; but forward contracts are only slowly negotiated. Some difficulty as to the areas of distribution under the new orders is being slowly overcome. Coke is in much better demand, with gas coke at 30s. to 32s. per ton f.o.b. The freight for coke to northern French ports is still 45s.

Reduction in Price at Wexford.—Gas consumers at Wexford have had the gratifying intimation that, as from June 30 last, the price of gas for all purposes has been reduced to 3s. 8d. per 1000 c.ft.

Hull Gas Department.—With reference to the audit of the Hull Corporation accounts for the twelve months ended March 31, the Auditor observes that the working profit on the gas department for the year was £2166.

Lisburn Gas Undertaking.—A report on the Lisburn gas undertaking submitted to the Urban Council showed that there had been a loss of £763 on last year's working—directly traceable to war conditions. With a view to economy, a Committee recommended that the cost of public lighting for the ensuing twelve months should not exceed £500, and also that the number of lamps to be lighted should not exceed 500.

Increased Make and Advanced Price at Middleton.—At this month's meeting of the Middleton Town Council it was reported that the make of gas for June showed an increase of 1,769,000 c.ft. as compared with the corresponding period last year. It was announced that adjustments had been made in the prepayment meters, so that the advanced price to users of them would only be 2d. per 1000 c.ft.—the same as to ordinary users.

Leyland Gas Company.—At the half-yearly ordinary general meeting of the Company last Wednesday, dividends were declared at the rate of 5¾ p.ct. and 5 p.ct. per annum, less income-tax, on the ordinary and preference stock respectively. It was announced that the vacancy on the Board consequent on the death of Mr. W. C. Buckley, who had been Chairman and Director for over fifty years, had been filled by the election of Mr. S. R. Ogden, and that Mr. Thomas Duxbury had been elected as Chairman of the Company.

Stafford Gas Undertaking.—A report just issued in connection with the Stafford gas undertaking states that a priority certificate has been obtained for the new vertical retorts; and Mr. W. M. Valon, the Engineer, anticipates that they will be ready for next winter's working. An urgent matter is that of the capacity of the mains. It would be no use having the holders full if the mains could not distribute gas to the customers. The provision of high-pressure mains would probably involve an expenditure of from £3000 to £4000. The matter is having serious consideration. The Local Government Board have given their formal sanction to the raising of £6500 to cover the cost of providing an additional boiler and plant with the necessary buildings.

Primitiva Gas Prospects.

In their financial column last Friday, "The Times" said: Judging rom correspondence we have recently received, shareholders of the 'rimitiva Gas Company of Buenos Aires are disappointed with the rolonged absence of a dividend on the preference shares, which is ow one-and-a-half years in arrear. It seems to have been assumed hat as the Municipality has paid a substantial portion of its debt to he Company, which amounted to about £300,000, the Company would ave been able before this to resume payments to the preference share- olders. But it is necessary to point out that the payments on account f the debt have not helped the profit and loss account, because, as he Chairman explained at the meeting, the municipal debt was treated n the accounts as a good asset. The municipal payments merely assist he Company to carry on its operations, by providing it with liquid unds for working capital purposes. Although these payments have ssisted the Company, its difficulties are by no means at an end. The normous increase in the cost of coal, which was mainly responsible or the decrease of £111,797 in last year's profits, has been augmented his year. Coal which in 1913 cost the Company £1 14s. per ton, in he early part of this year cost £4 7s. 5d.; and the difficulty of shipping t is steadily growing. Last year, when coal was £1 3s. per ton cheaper han now, the actual net cost of the gas manufactured was 62 p.ct. igher than in the preceding year; so that it would appear that the ercen tage this year will be higher still. In these circumstances, it vould seem unwise for shareholders to expect a resumption of divi- lends until an improvement has taken place in the fuel situation.

Increased Pay for Lancashire Gas-Workers.—Corporation workers n several Lancashire towns benefit as the result of the award of the Government Committee on Production on the application for advances in wages made by the National Union of General Workers and the Bolton and District Gas-Workers' Association. The towns include Birkenhead, Bolton, Bury, Colne, Leigh, Manchester, Nelson, Old- ham, Rochdale, Tyldesley, Wallasey, and Wigan. The Committee decided that those of the grades of employees who are in receipt of a less war wage advance than 9s. per week in the case of men (calcu- lated upon the pre-war rates) and 6s. in the case of women shall receive such further amount as shall make their advance 9s. or 6s. per week, such increases to date from the first full pay-day following June 11. At a meeting of all grades of workmen at Oldham—the stronghold of trade unionism, and Lancashire head-quarters of the National Union of Workers—on Wednesday last, dissatisfaction was expressed with the award; and the men protested against what they considered to be unfair discrimination by the Committee on Produc- tion. It was pointed out that the railwaymen's bonus had recently been increased from 12s. to 15s., and converted into extra war wages, instead of being regarded as a war bonus. They considered they were just as much entitled to the 15s. as other classes of workers. The meeting decided that the Union officials should take an early oppor- tunity of putting forward an additional wage claim of 3s. per week.

Calorific Power Testing Apparatus for Exeter.

At a meeting of the Exeter City Council last Tuesday, the Town Clerk reported a request from the Exeter Gas Light and Coke Company, Ltd., for approval of the adoption of the Simmance-Abady total heat calorimeter for testing the calorific power of gas supplied to the city. He also reported upon the results of inquiries he had made as to the efficiency of the apparatus. The Lighting Committee recommended that approval be given, provided all the measuring instruments are standardized, and subject to the Council reserving the right to with- draw such approval if at any time a more efficient calorimeter be in- vented and placed on the market. A letter was read from the Board of Trade requesting the observation of the City Council upon an appli- cation from the Company for an extension of the time within which, under clause 4 (2) of the Order, the Company are to provide apparatus to test the calorific power of the gas supplied by them. The Order required that the apparatus be supplied by April 27. The reasons alleged for the application were: (1) The failure to complete the altera- tion of the premises to provide the necessary accommodation, owing to the difficulty of getting material and the shortage of labour; (2) the negotiation with the City Council as to the apparatus to be provided. The Town Clerk reported that he was informed that the structural alterations were approaching completion, and he had obtained an assurance from the Company that there was no intention to delay the fitting-up of the apparatus for one moment beyond the time that the makers would take to supply it. The Council resolved that they would raise no objection to compliance by the Board with the application of the Company, provided all reasonable diligence was exercised in fixing the apparatus.

Complete Gas Combustion, Ltd.—This is the title of a private Company registered with a capital of £1000 in £1 shares. The office is at Vickers House, Broadway, Westminster, S.W.

Price of Gas at Burton-on-Trent.—In view of the heavy demands which have arisen in respect of increased wages and reduced assess- ments, the Finance Committee of the Burton-on-Trent Town Council have decided to ask the Gas Committee to grant an additional £2000 towards the relief of the rates, making £7000 in all.

Dorchester Gas and Coke Company, Ltd.—In submitting the half- yearly accounts to the shareholders at the meeting to-day, the Direc- tors will report that there has been an increased consumption of gas, compared with the corresponding half year, of 1,460,000 c.ft., which they consider very gratifying, having regard to the existing lighting restrictions and the Summer Time Act. The financial results for the half year have been, under the circumstances, satisfactory. During the period under review, the Directors have invested a further sum of £191 in the War Loan, the Company's holding in which now stands at £1250. They will recommend the payment of dividends at the rate of 5 p.ct. on the ordinary capital and 6 p.ct. on the preference capital, both less income-tax.

Maidstone Gas Company's Meeting.

The adoption at the annual meeting of the Company of the report reproduced on p. 245 of last week's "Journal" was moved by the Chairman (Mr. George Marsham), who said coal had cost in round figures £8600 more than in the previous year, owing to the freights, which at one time reached 21s. per ton from the Tyne to Rochester. During the year 7000 tons were brought by rail; and he hoped a larger amount of Yorkshire coal would be delivered in the same way during the current year. Their principal supply, however, must come from Durham; and by order of the new Coal Controller, this must all be brought by sea. To assist in bringing coal down the East Coast, the Government had instituted the Admiralty Coasting Trade Office, and had put some freight at their disposal. As far as they could, the Company were taking the benefit of this; but the prices were only slightly below the market rate. In addition, owing to the usual wharf at Rochester being no longer available, they had to unload the coal in London and bring it round by sailing barge, which caused heavier expense. Sales of gas for last year showed the satisfactory increase of 7 million c.ft., and the receipts for gas an advance of £6481. The returns for residuals also showed satisfactory increases. Owing to the great demand for sulphur for the manufacture of sulphuric acid, the purification account, instead of being a charge upon them, as it usually was in peace time, showed a profit of £553. In response to a request from the employees, an all-round increase in the war bonus was made, in addition to some advances which had been granted in the carbonizing department. As regarded the future, the increasing cost of wages and materials had compelled an advance of the price of gas by 6d. per 1000 c.ft., which meant a reduced dividend. This brought him to the question of the sliding-scale. If this just principle was in vogue in all industries, no doubt it would be an excellent state of affairs; but unfortunately this was not so. In the coal industry, indeed, the position was exactly the reverse. The higher the selling price of coal, the more the coal miner received in wages, and the more profit there was for the shareholders in the mine. In these circumstances, the Directors felt that gas shareholders were perfectly entitled to ask the Government for some relief. The thanks of the Directors and the shareholders were due to the staff and employees generally for the loyal and devoted way they had looked after the interests of the Company.

Belfast Gas-Workers Wages.—The Belfast Corporation confirmed the minutes of the Council in Committee granting employees of the Gas Department who are not skilled artizans war wages at the rate of 11s. per week for those eighteen years of age and over, and 8s. for those under eighteen—the advances to take effect as from June 1 last. The recommendation was based on an award by Mr. W. H. Stoker, acting as Arbitrator. An amendment to the effect that the award should apply to all employees of the Corporation, instead of to gas employees only, was negatived.

Tralee Gas-Works.—A Local Government Board inquiry has bee held at Tralee, in relation to an application by the Urban Distri Council for sanction to a loan of £2000 for the purpose of installin new plant at the gas-works.

Tandragee Acetylene Gas Supply.—A special meeting of the Tar dragee (co. Armagh) Urban Council considered the question of th winter lighting, public and private. It was intimated that the Council acetylene gas-works had been closed for three months, owing to i ability to obtain carbide under the Government prohibition restrictin the supply. The Clerk stated that a supply had now been obtained the cost being £32 14s. per ton delivered, or £10 per ton increase ov last year's contract price. The pre-war price was £12 10s. per ton At that time the price of gas was 3s. per 100 c.ft.; last year the pric was increased to 4s. It was decided to resume the manufacture an supply of gas to consumers, and to increase the price to 6s. per 100 c.ft —the supply to be cut off each evening at 10.30.

Malton Gas Company.—At the half-yearly meeting of this Com pany last week, it was stated that war conditions had caused labou and materials to be very costly and difficult to secure. A dividend fo the half year of 5 p.ct. (free of income-tax) was, however, recommended In moving the adoption of the report, the Chairman (Mr. Hugh W Pearson) said that by next winter it might be necessary to increase the charge for gas, though he would not say it was absolutely certain Any such increase would not be due entirely to the higher cost of coal because their contract had been renewed at the same price as las year. But the labour bill was going up very greatly, and it was in creasingly difficult to get labour at any wage. Since the war began the price of the Company's gas had been increased only 6d. per 100 c.ft., which was much less than the increase by neighbouring com panies. At the same time the increase had been equalized by reducing the dividend by 2 p.ct.; so the Directors had held the balance fairly between the consumers and shareholders.

Quality of Gas at Coatbridge.—With regard to the recent discus sion in the Coatbridge Town Council regarding the quality of the ga supplied by the Coatbridge Gas Company, it is pointed out on behal of the Company that at the outset of the war, and at the express desir of the Minister of Munitions, they started tar-washing. While thi process gave fairly satisfactory results, the Munitions Departmen found that if their requirements in high explosives were to be satisfie they would have to insist on the introduction of an oil-washing plan at Coatbridge, as well as at other larger gas undertakings. During August last year a Provisional Order was granted to the Company t authorize the raising of additional capital for extensions of works; and the provisions of the Calorific Standard Act were embodied in it, so as to enable the Company to proceed at once with oil-washing. The work was carried out entirely by the Company's own staff, and the plan has now been in operation for a considerable time. The Company have been complimented by the Ministry of Munitions on the excellen results obtained by them.

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MANCHESTER. NOTTINGHAM.

Export of Synthetic Dyestuffs.—The Director of the War Trade Department announces that, except in special circumstances, applications made after Aug. 10 for licences to export synthetic dyestuffs will only be considered if they are accompanied by a certificate from the actual manufacturer, or his accredited agent, to the effect that the goods have been sold expressly for export to the destination mentioned in the application. Applications now before the Department will, however, be considered by reference to the circumstances arising in each particular case.

Eastbourne Gas Company.—The Directors, in their report for the six months ended June 30, remark that the revenue account shows a profit of £7129. A sum of £751 has been transferred from the reserve fund to the profit and loss account. They recommend the payment of dividends for the half year at the rate of £6 8s. 9d. p.ct. per annum on the "A" stock, £4 18s. 9d. p.ct. per annum on the "B" stock, and 5 p.ct. per annum on the preference stock. There are, they say, two outstanding features in the accounts. The first is the ever-growing cost of coal and oil, upon which the sea-freight charges have increased to an incredible extent. The other is the enhanced wages granted to the workmen, owing to the cost of living. To meet these, the Directors have had no alternative but to further increase the charges for gas.

Brisk Demand for Gas-Cookers at Stockport.—The minutes of the last meeting of the Stockport Gas Committee showed that the Engineer reported that there were 276 simple hire orders on hand for gas-cookers, and that there were only 131 on hand and 12 to come in. It was resolved that the Engineer should order 150 further cookers.

Leatherhead Gas and Lighting Company.—In presenting to the shareholders the accounts for the year ended June 30, the Directors report that the receipts have amounted to £22,981, and the working expenses to £18,978, leaving a profit of £4003, to which must be added £2092 brought from the previous year, making a total of £6095. Deducting interest on loans, debenture stock, and on bank overdraft £984, also income-tax £785, and the interim dividend of 2½ p.ct. paid in February last, £1155, making a total of £2926, there is a balance of £3169 available for division. They recommend the payment of a final dividend of 3 p.ct., making (with the interim dividend of 2½ p.ct.) 5½ p.ct. for the year. This will absorb £1389, and leave £1780 to be carried forward. Sales of gas have increased from 72 to 86 million c.ft. during the year. The Directors add that the shareholders will all regret to hear that the Company's Consulting Engineer (Mr. F. S. Cripps) has resigned, after twenty years' service; while the appointment of Mr. E. H. Stevenson to fill the vacancy is a matter for congratulation.

STOCK MARKET REPORT.

The Stock Exchange reopened on Tuesday after its brief holiday, and had an almost equally brief week of business. Having regard also to the fact that we are now fairly launched into the Autumn vacation, the volume of transactions was decidedly limited. Despite the quietude, however, the tone was quite good, markets in general exhibiting great firmness. There was no particularly stimulating incident connected with the war to account for this; but our steady gains on the Western front, though of modest and unsensational magnitude, were welcome on the principle that every little helps; and there was a disposition to entertain hopes that the Russian internal situation was gradually clearing. The week thus proceeded harmoniously, and closed with strength.

Home Government issues possessed prominent attractions; chief among these being the 4½ p.ct. War Loan. The anticipation of a new loan issue at no distant date—the Bill for it having been read a second time—created a strong demand, inasmuch as the unconverted 4½ p.ct. loan enjoys conversion rights of acceptation at par of 100 in payment for an equivalent amount of any subsequent issue. This sent its price up to 98½ on Friday. Home Rails were very quiet and almost unchanged, and dividend announcements left the market cold. Canadians effected further advances in view of the Government acquisition scheme, but not all to an equal degree. Argentines were dull, on poor traffics and further capital requirements.

The Foreign Market was fairly active. French were in good request, and Scandinavian recovered after a bad start. Japanese were steady; but Russian and Brazilian were down. Among the rest, Rubber and Oil showed renewed strength, and Textiles and Meat concerns were in favour.

Business in the Gas Market was moderately good, considering that the time was not favourable to activity; and the general tendency, as indicated by the marked bargains, was quiet. Changes in quotation were few in number and minute in degree. Not a single transaction was done in Primitivas. From published statements in the Press, holders of the preference shares appear to be growing restive at the non-payment of a dividend. We would suggest that they may trust the Directors to resume payment as soon as it may become prudent to do so. The South Metropolitan Gas Company are about to invite subscriptions to £250,000 redeemable 5 p.ct. preference stock.

The Money Market was easy.

Bargains done for cash during the week were as follows: On Tuesday, Alliance and Dublin 53½, 53⅜, Continental Union Preference 62, European 11¼, 11½, Gas Light ordinary 68½, ditto 10 p.ct. bonds 170, 170½, Imperial Continental 80, 80¼, Oriental 105, 105½, South Metropolitan 73½. On Wednesday, Gas Light ordinary 68¼, 68½, Imperial Continental 79½, 80, 80¼. On Thursday, Continental Union 40, Gas Light ordinary 67⅞, 68⅛, 68¾, Imperial Continental 79½, 79¾, Newcastle 70½, Oriental 105½, Portsea Island "A" 93½, 93¾, 94¼, South Metropolitan 73⅜, 75, Tottenham "A" 96½. On Friday, Commercial 4 p.ct. 72½, 73, ditto 3½ p.ct. 66½, ditto debenture 52, Gas Light ordinary 78¼, 79, ditto 10 p.ct. bonds 170½, Imperial Continental 80, San Paulo debenture 40½, South Metropolitan 74, ditto debenture 56, Tottenham "B" 71.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	58—63	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	53½—53¾
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5¼	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water (10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.)	29—30	24—26	..
383,110	10	,,	7	7/-		15—15½	10⅜—11¼	..
115,000	10	,,	6	6/-		13½—14	9¼—9⅝	..
159,740	—	—	—	4%		..	6⅝—7⅛	..
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid.	261—266	79—82	..
734,920	,,	,,	11	4¼%	Do. B New	204—209	77—80	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65 67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66 68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	54—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2⅛	2½—3	..
100,000	10	—	—	4⅛%	Do. 4½ p.c. Pref.	4—6	6⅜—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70 75	60 65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	72 74	72½—73
560 000	,,	,,	5⅛	46/8	Do. 3½ p.c. do.	103—105	66—68	66½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	52
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	40
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	62
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd.	17½—18	11—12*	11½—11½
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke (4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds)	98—102	67—69*	67¾—69
2,600,000	,,	,,	3½	3½%		76—79	54—56*	..
4,062,235	,,	,,	4	4%		96—99	70—72*	..
4,674,850	,,	June 11	3	3%		72½—74½	55—57	..
130,000	,,	,,	10	10%		..	..	170—170½
258,740	,,	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16¼—16½	7½—8⅜	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅞%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	79½—80½
1,235,000	,,	Feb. 12	3½	3⅜%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. (A / B)	211—213 / 146—148	82—83	..
306,083	,,	June 26	4	4%	Do, 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅝	3¾—4*	..
250,000	100	April 1	4½	4½%	Met. of Melbourne (4½ p.c. Deb.)	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71*	70½
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61 63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	105—105½
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅜	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	92 97	..
100,000	50	,,	12	11%	Do. C	118—121	85—90	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1⅜—2	..
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	2⅜—3½	..
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. / 5 p.c. Deb.)	10¼—11	7¼—8¼	..
125,000	50	July 1	5	5%		47—49	40—42	40½
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African.	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	73—75	73½—75
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	56
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	77—79	..
135,000	—	—	—	48/4	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham District (A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.)	135—138	95—100	96½
782,275	,,	,,	6	3⅛%		115—117	68—73	71
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c.	151—156	114—119	..
255,636	,,	,,	6⅜	65/-	Do. B 3½ p.c.	129—134	99—101	..
108,075	,,	,,	5/17/8	56/-	Do. C 3½ p.c.	110—115	86—91	..
852,000	,,	,,	6⅜	58/9	Wimbledon 5 p.c.	117—122	88—93	..
98,000	,,	,,	6⅜	65/-	Epsom 5 p.c.	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

According to "The Times," in order to economize fuel, it has been decided to reduce the lighting by 25 p.ct. in all the chief towns in Egypt.

The Gas Light and Coke Company have, it is stated in the "Co-Partners' Magazine," sustained their sixth disaster of the kind by the mining, on July 10, of their fine new vessel the s.s. "Flamma." There was happily no loss of life; and the ship was eventually grounded within half-a-mile or so of land.

An official list includes the names of 158 manufacturers in the United States producing: Coal-tar crudes, 23; intermediates, 70; artificial dyestuffs, 99; vegetable dyestuffs and extracts, 18. Sixteen firms produce 841,200 gallons of benzol, toluol, xylol, and phenol; twenty produce 6,186,000 lbs. of naphthalene, carbolic acid, &c.; twenty produce 5,821,650 lbs. of intermediates; seventeen produce 1,138,100 lbs. of artificial colours; and eleven produce 6,678,500 lbs. of vegetable dyestuffs and extracts.

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EDITORIAL NOTES.

Lower Temperature Carbonization and Tar Production.

A FORTNIGHT ago, in our editorial columns, there was mention of the appeal that the Ministry of Munitions were making to gas undertakings to produce as much tar as possible. The suggestions officially made for realizing the requirement were two—the shutting-down of water-gas plants, excepting in so far as they were necessary to meet the demand for gas in excess of the capacity of the coal-gas plants, and the reduction of the temperature of carbonization. At the time we remarked that, in complying with the latter suggestion, numerous difficulties would certainly be encountered, more particularly in view of the already shortening days, and the daily move towards the heating season. There was also in mind the fact that lower temperatures meant an additional quantity of coal to be handled and carbonized, the shortage of labour on many works notwithstanding, as well as the fact that materials, labour, and capital have, through war-imposed conditions, conspired to prevent on many works extensions of plant, and the observation of the ordinary standard of upkeep.

Apart from these disabilities, there is a second consideration. Nothing is said by the Department concerned as to the quality of the tar required; quantity only being mentioned. But to lower the carbonizing temperatures would, in the first place, increase the paraffins in the benzol, and this would affect the question of its suitability for explosives purposes. It is therefore easy to assume that the new request is due to requirement in some other direction than explosives. But this does not alter the consideration that, in this matter of the drop of temperature of carbonization, one cannot serve two masters with maximum efficiency.

A further consideration, and a very vital one, comes in. It may be prefaced by saying that the temperature of carbonization cannot possibly be dropped to a sufficient extent to do any good in augmenting tar production per ton of coal without jeopardizing the supply of gas in not a few areas, and making the coal gas process such an expensive one per ton that—more especially in present circumstances—some gas-works could not possibly live without very considerable assistance. But increase of tar production per ton of coal is not the only point. An augmentation of the quantity per ton of coal does not necessarily mean an increase in the bulk. Since the suggestion was promulgated that a lowering of the temperatures would give the quantitative increase desired, brains have been examining the position, and have come to the conclusion that reduced temperatures would defeat, and that seriously, the very object that the Ministry have in view in making their recommendation. In the first place, reduced carbonizing temperatures mean a reduction of carbonizing capacity per unit of plant; and there is a limit to the available coal-carbonizing plant. It follows that diminished capacity means a diminished throughput of coal; and a diminished throughput of coal, a diminished total production of tar. What is gained per ton would, and in considerable measure, be lost on the total. To put a hypothetical case. If, by reducing carbonizing temperatures (say) by some 400° Fahr, the quantity of coal carbonized in a given plant is nearly halved, the total gas made is reduced by more than one-half, and the total quantity of tar is reduced by upwards of one-third, then how will the lower temperature work profit the Ministry of Munitions in the matter of an increased production of tar, or in maintaining the production of benzol and toluol? Not only would there be less tar made, but there would be less coal gas to wash for benzol, more coal to be carried, and more labour needed to deal with it. Looked at in this way, there would be an actual and heavy sacrifice of precisely what the Ministry are asking for, to say nothing of the putting of additional difficulty upon an industry already surcharged with troubles developed by the war. The better course to pursue is to continue to urge householders and industries to consume gas in place of coal, and so enable the gas undertakings to economically carbonize as much coal as plant will permit at their ordinary temperatures. In this way, the Ministry of Munitions would get the quality benzol they require, and at the same time an enormously larger bulk of tar per unit of carbonizing plant and per unit of time, if not per ton of coal. The question is one for very serious consideration.

The Appropriate Time for Sliding-Scale Revision.

THERE is a pretty general feeling now among the leading administrators in the gas industry that the sliding-scale must be amended to meet new conditions. The hard logic of present facts and of prospective circumstances is too much even for those who actively resisted some time ago (when things were less serious) all the advances made to get a movement on towards what has been proved, with uncomfortable vehemence, through lost dividend and depreciated market values, to be very desirable. Gas proprietors, it is also frequently noticed now, and not with surprise, are becoming restless; and there is not the slightest doubt that among some people who are investors for the sake of income, the gas industry is gradually losing reputation. This alone is a grave matter for an industry that is anticipating a large expansion of business, and consequently a considerable demand for capital, and which industry, with its fortunes dependent upon economy, must do its utmost to maintain attractive conditions for obtaining capital on the best possible terms. It will take a large amount of eloquence and a considerable span of time to wipe away the gloomy feelings that are being engendered as to gas dividends not being altogether so safe as was believed under quondam conditions. However, the discussion has done some good in promoting unity of opinion that the terms of the sliding-scale must undergo modification. The principal question now at issue is as to the appropriate time for pressing the matter upon the attention of Parliament, and appealing for the righting of what has become a gross injustice, inflicted by a (in past normal times) useful piece of legislation, but every fundamental condition of which has in recent times been undermined.

That is the point over which difference of opinion now prevails. Some of those most ardent in the belief that there must be revision are the most difficult to move from the stand they are making against approaching Parliament during war time. Their responsibility is great; for they happen to be those who, representing the largest gas capitals under the sliding-scale, must lead in any appeal made to Parliament. The Chairman of the South Metropolitan Gas Company (Mr. Charles Carpenter, D.Sc.) is one of these. He recognized long since the want of harmony between the sliding-scale and the new conditions; but what appears to have happened in his case, as well as in others, is that the first approach to a Government Department, resulting in a courteous intimation that the time was inconvenient for any change, has damped-down perseverance in effort in every available direction to get the wrong immediately righted. No time ought to be inconvenient for supplanting an injustice by justice. A Parliament that has time for considering, during the progress of war, such trivialities as the existence of a grille that concealed fair

beauty from the eyes of the politicians—real and otherwise—below, ought surely to be able to find time to help to redress an injustice that in its worst form is a product of the war. Mr. Carpenter, at the meeting of the South Metropolitan proprietors last Wednesday, touched upon the subject of the sliding-scale. In his reply to the discussion following his address, he admitted that the Board are alive to the hardness of the operation of the sliding-scale where stock is held by those least able to bear the loss of the substantially reduced dividend. But he said this reason would not be considered sufficient by Parliament. Prior to that, having agreed that in war time the sliding-scale is out of date, he observed: "I think Parliament would be sympa-"thetic." This is a contradiction of the inferred present indifference. Nor is there any need to ask Parliament to consider the case solely from the point of view of effects, but to consider it as well from the point of view of causes. And if Parliament has any sense of justice, it will see to it that an industry so hard hit by the war, through the operation of a now inconsistent enactment, is given some temporary relief, pending the larger question of a permanent readjustment of terms to conditions, and this to an industry whose ill-rewarded capital is being largely used for national purposes.

Read down the impressive speech of Mr. Carpenter, and an amplitude of causes will be found there which have produced the gloomy effects for gas stockholders. The Chairman points to the regulation of the price of coal, and places it to the credit of Parliament, to whom for it the gas industry ought to be profoundly thankful. Agreed. But Parliament only did half its work for gas undertakings using seaborne coal by not dealing with freights. The good in one direction was negatived by omission in another. The huge coal stocks now being laid down by gas undertakings are a protection not only to them but to the community at large, and they are a national assistance. They are costing money, and not earning interest before the period of use. Again, there is the heavy cost of war allowances representing in the case of the South Metropolitan Company last half year 4d. per 1000 c.ft., and now about 5d. Is this the maximum? Is there any assurance that there will be no other supervening costs? Is there any confidence that the lean dividends now being distributed by the London Companies will not be subjected to a still higher income-tax? The Board of the Company think that in the directions of coal and labour the peak of the costs have been reached. Twelve months or so ago, the Board reduced the price of gas 2d.; this year they have increased it 5d. They acted in the light of their then current circumstances; but the uncertainties of the position are well illustrated. So long as present costs continue to represent the peak, Mr. Carpenter does not see how we could expect any relief from Parliament while the war rages. Is, then, the present dreary position for gas investors the dividing-line between appropriate relief and inappropriate relief? If so, then the process of depreciation and the burden of hardship are allowed a long spin and the attainment of remarkable dimensions in effect before rectification is admissible. The Gas Light and Coke Company are paying £3 14s. 8d. p.ct. per annum, less income-tax, which makes the net payment about 3 p.ct. This for an industrial undertaking cannot rank as plethoric. The South Metropolitan Company will only be paying 4 p.ct. next Christmas, less income-tax. There is every reason, says the Chairman, to think that the Company will get through to the termination of the war at no lower rate, in which case he thinks the proprietors will have cause for congratulation, despite the very obvious hardships the reduced figure entails. The Commercial Gas Company are paying a dividend of £4 8s. p.ct. on their 4 p.ct. stock, and 4 p.ct. on their 3½ p.ct. stock. The Chairman (Mr. W. G. Bradshaw) says it is, unfortunately, impossible to say that the Board will not have to raise the price still further. A microscopic examination of the position or an examination by comparison with other industrial concerns hardly carries conviction as to the existence of any ground for congratulation to the recipient of a 4 p.ct. or lower dividend, less 5s. income-tax. There would be greater cause for congratulation if Parliament could be induced to adopt a temporary scheme of relief, with the matter of permanent readjustment deferred for deliberate investigation later.

On the excellent case that Mr. Carpenter's address furnishes to the contrary, he cannot see that this is as good a time as after the war for seriously tackling the matter in Parliament. Perhaps the proper time for considering the terms of peace will be after the remembrance of the transgressions of the enemy against all human and higher laws have been softened by the emollient Time. On the other hand, Mr. A. M. Paddon regards the present as the most opportune time imaginable; and during the discussion at the meeting he gave cogent reasons for his belief. There is danger in putting off till the morrow what should be taken in hand to-day, and taken in hand perseveringly. Meantime, gas proprietors in various great concerns are asked to be of good cheer, as the thin dividends reach them.

Meeting of the Irish Association.

The members of the Irish Association had an attractive programme last week for their meeting, held under the presidency of Mr. A. S. Brook, of Lisburn, whose experiences in various places under differing circumstances enabled him to compose a Presidential Address treating from a broad point of view of several matters of current and general importance. Naturally during the address and at various parts of the meeting, coal and freights came in for considerable comment; and the limited assistance that the Irish gas undertakings have obtained in these directions—despite their representations—is the ground of grievance which cannot be called unreasonable. In their circumstances, they are totally unable to help themselves in these matters. During the war they are particularly the victims of their geographical condition in relation to the coalfields; and, instead of costs for coal and freights descending as a result of their appeal for help from the "powers that be," freights at any rate have, even within the past year, made still further ascent, till now the President is able to say that in the West of Ireland some six times the pre-war rate has been paid. Within the year (so Mr. J. Paterson, of Waterford, states) freights have added another 30 p.ct. to their former girth. On top of these conditions, stocking for the winter is a seriously expensive operation. Altogether the position is a crippling one for many of the concerns. Whether any good could be done in the way of relief, by the formation of a Commercial Section—which should go further, according to a proposal submitted to the meeting by Mr. J. T. Reid, than Commercial Sections have gone before—cannot be said. In the circumstances of Ireland, he thinks a Commercial Section might be developed that could be, in addition to the customary functions of such a body, a co-operative purchasing organization for gas concerns. This might do some good in current circumstances; but we can see the intricacies of the new situation would not be slight, and the organization would want very careful handling and working. However, there was divided opinion among those who took part in the discussion as to whether such a new venture should be made; but we rather think Boards and Committees will want a say in this matter before such a section is floated, and its scope and functions clearly defined. At the meeting nothing was settled. It is hardly possible, however, that such an innovation, while it may have the sympathy, would be participated in by the largest undertakings of the country, seeing that they are of sufficient calibre to look after themselves, and would not want their dealings complicated by external considerations.

However, the difficulties of the administration of gas undertakings in Ireland are not light in normal times, and they are almost back-breaking now. Mr. P. J. Philpott pictured some of them in his paper on exceptional difficulties that he has met with in the administration of the Mallow gas-works. But some of the difficulties experienced at the smaller gas-works are traceable to heavy capital expenditure in relation to business done, and to deficient upkeep of plant and reticence (through the weight of existing capital) in adopting more economical processes. The heavy capital in the case of some of the local authority owned undertakings, the President puts down to the extent of the purchase money and the cost of the opposed parliamentary proceedings that authorized the transfers. It is through this that a few local authority gas undertakings do not stand so well as is generally the case in a comparison with local electricity concerns that have had fairly modern birth, and into which the local authorities went *ab initio*. The President sets his face against gas-works purchase unless it can be without opposition in Parliament and without expensive arbitration—seeing that money is squandered that should be put into, and not hung as a weight upon, the works. But local authorities are not now so keen over buying gas undertakings. Companies are loth to part; and the property fetches good money. Moreover, it is very rarely now that local authorities can find the excuse of want of enterprise with which, and therefore the

ground of public policy upon which, to approach Parliament for purchase powers. We will give electrical competition credit for having stimulated sleepy gas administrations, and made them put energy into the development of a business that has commodities to sell of immense importance in our modern life and national development. Another thing is that economical manufacturing processes are not to-day an exclusive privilege of the larger concerns. They can, as opportunity allows, be adopted by every gas undertaking—company as well as local authority. A paper bearing upon the question of economical production, and upon that of economical utilization of coal in gas-works, was the one read at the meeting by Mr. F. G. Ambler, on intermittent vertical retorts for medium-sized and small gas undertakings. Particularly interesting is the part of the communication that deals with the two-hour steaming of the charges at the rear end of the carbonizing period—thus producing as a diluent a gas containing about 6 p.ct. of inert constituents, and having a calorific value of 328 B.Th.U. The tables accompanying the paper, giving authorized data from named gas-works, are remarkably satisfactory and very edifying. The working certifies high gas makes, calorific values to which no one can take exception, and a percentage of incombustibles that is a very favourable recommendation to the process. The figures, as well as the remainder of the paper, are well worth study. But there is just one question regarding the steaming; and it is, What is the effect upon the stability of the coke?

Purifier Efficiency and the Direct Sulphate Process.

The portion of the annual report of Mr. W. S. Curphey, Chief Inspector under the Alkali Works Regulation Act, which reviews his continued researches into purification inefficiency and the loss of ammonia where the direct process of sulphate of ammonia production is in use, places the gas profession under a further obligation to him, and not only those members of it who have the "direct" process in operation but others, because purifier inefficiency exists elsewhere, and the investigations show that it is capable of improvement. The direct process of sulphate of ammonia production is a comparatively new one in the gas industry; and, though previously in use in the coke-oven industry, the same problems do not arise there, owing to the absence of the need to pay special attention to the question of the purification of gas by oxide. However, the continued investigations (although still incomplete) prove that a year ago Mr. Curphey had already obtained a good grip of the problems that have presented themselves, and that his suggestions for improvement in both directions were on the right track. The proof is found in the actual enhancement of results where the suggestions have been applied. But there is not so far complete satisfaction on the part of the investigator; and he has yet to "run to earth" certain pertinent matters so as to justify definite conclusions. He has, however, arrived at a stage where he is forced to the opinion that data from large scale working—subject as this working is to a disturbing diversity of conditions, and therefore of inexactitude—will not enable a complete determination of the effect on efficiency of various factors, and that it is essential that large-scale tests should be made in the laboratory, in order to secure reliable data. He has himself made a beginning with this work; but he appeals to gas-works' chemists to assist him to elucidate some of the many questions calling for study, seeing that they have experience and facilities for research which must far exceed those available to one entering into the subject from (as it were) outside the industry.

Those engineers and chemists who are following up the results of Mr. Curphey's researches will remember that—apart from the loss of ammonia with the direct process—he found that certain conditions which are necessary for purifier efficiency are attacked and depreciated by the direct process. But the attractions of this process cause him and others to indulge the hope that these conditions can be surmounted. Indispensable to good working is regularity of operation and chemical supervision, which is a point that is being intensified day by day, since gas-works are becoming more and more chemical works, and the efficiency of every one of the processes rests upon a chemical basis. As to the matter under observation, purifier efficiency depends very largely on the percentage of moisture in the oxide and the temperature—regard also being had to such factors as the relation of purifier area to gas make, rate and direction of gas flow, the condition of the gas itself in regard to ammonia and oxygen content, the absence of soluble salts of iron, and the physical condition of the oxide other than humidity. With the direct process of sulphate production, it is found that the crude gas leaves the acid bubbler at a relatively high temperature and highly charged with moisture. The acid content of the bubbler, too, varies within wide limits; and the surface layer—the last in contact with the gas in the purifying system—has at times been found alkaline, while the bottom layer has been highly charged with acid.

Another condition which contributes to bad purifier working is through the oxide of iron being delivered, and put into immediate use, with a moisture content sometimes of upwards of 50 p.ct. The purifiers may also be in exposed positions, subjected to great changes of temperature; and they may be worked in sequence, with an upward flow of gas. Some engineers—like Mr. W. C. Jones, at the meeting last October of the Midland Gas Association—contend that they get better results with a high percentage of moisture in the oxide; but where this is the case, as in his, there are usually exceptional conditions prevailing. This being so, there must be care in accepting conclusions empirically derived, without investigating the circumstances to see if there is any special reason for the experience. Mr. Jones will read Mr. Curphey's criticism with interest, will observe how the conditions of his purifiers were such that, though he has a preference for a moisture content of from 50 to 60 p.ct., his system is one which tends to lose rather than to gain moisture, and will perhaps consider where the large tonnage of water really disappears to. Of this there is certainty, that Mr. Jones could not use his purifiers under the conditions described with the direct system of sulphate making. Of course, in all purifier boxes the contents are progressively undergoing change; but Mr. Curphey's further investigation convinces him that, the closer one can maintain a suitable degree of hydration of the oxide, the better. It will be remembered that last year he suggested 5 to 10 p.ct. of moisture; this hydration having regard rather to the reactive ferric hydrate content of the mass than to the total mass of material, active and inert. Subsequent research does not lead him to depart from his conclusion in this respect; as a matter of fact, at two works that have been under special observation with the direct system of sulphate of ammonia production in operation, the result of using drier and matured oxide has been that all previous purification results have been "far "exceeded. This points to the need for fresh oxide being stocked and brought into condition preferably in the summer months, and not put into use in a fresh and highly moist state at periods coinciding with maximum gas makes, with an exceptional amount of ammonia needed to maintain the oxide in a neutral condition. Experiments in a model purifier on the sulphiding of hydrated oxide, so far as they have gone, indicate that "oxide of 16 p.ct. moisture—corres-"ponding approximately to $Fe_2O_3 3H_2O$ (16·8 p.ct. moisture) "—is markedly more efficient than equal volumes of oxide "containing 37 p.ct. of moisture ($Fe_2O_3 6H_2O$) and oxide "dried at 100° C. (Fe_2O_3) respectively, at both high and low "temperatures."

Turning to the question of oxide temperature, this was dealt with in the suggested conditions governing purification in last year's report, and reproduced in this. Briefly, the conclusion was that a working temperature of 70° to 80° should be suitable under ideal conditions; but results now indicate that, given proper conditions, temperatures much exceeding the limits named are consistent with efficiency. Mr. Curphey has a justifiable cause of complaint. He does not make it pointedly, but suggestively. He cannot find that purifier temperature has received any adequate study; and such as there has been has not been made with due regard to the varying temperatures that prevail through the conditions obtaining in relation to the purifiers themselves. Boxes differ the one from the other; one grid from its neighbours; exposure has a varying effect upon temperatures near the lids and the sides; and moisture condensation (especially with the direct process of sulphate making in use) has on the oxide contiguous to the lids and sides a noticeable effect on temperature. Temperature study should be made in the oxide itself; and Mr. Curphey has been doing this with thermometers attached to metal rods sliding in fixed tubes. These show the great variations of temperatures that take place. Though the rise of temperature in the middle layer or central portion of the oxide—not being subject to the same disturbing variations of temperature as the others—affords the better indication of the progress of purification, he cannot say that the records furnish any particular guidance as

to the progress of purification, nor do they supply a means of anticipating periods of purification disorganization. Thus Mr. Curphey, so far as the experiments are concerned, has to fall back on the generalization that, while undoubtedly rise of temperature (under all conditions of hydration) favours purification, a suitable temperature *per se* is insufficient to secure regularity of working. Other factors operate, such as those already mentioned.

The question as to the amount of ammonia that should be supplied to purifiers (in which connection there has been considerable waste by an uncontrolled supply) is also one of some difficulty, and requires further investigation. Mr. Curphey's experiments have not yet resulted in any determinate results; but, so far as he has gone, they have convinced him that the only proper means of regulating the amount of ammonia to the requisite degree is by test. This is a rational finding, in view of the fact that it is the chemical condition existing in the purifiers that calls for the admission of ammonia. But as to the need for ammonia, from the experiments made there appears to be good reason for believing that the amount required to maintain the oxide in a state of neutrality, or slightly alkaline condition, bears direct relationship to the quantity of ferrous sulphate formed, and that the formation of ferrous sulphate is favoured by excessive moisture and possibly low temperature. The detrimental effect of ferrous sulphate upon the activity of the purifying material, and its retarding action upon revivification, are mentioned. There is a calculation as to the quantity of ammonia required under certain hypothetical conditions; and it is shown that, where the direct process of sulphate of ammonia production is in use, an amount of ammonia far exceeding the quantity present in crude gas is needed during the periods of purifier disorganization. As to the admission of the ammonia, Mr. Curphey is inclined to pass in part of it to the second box instead of all to the first one. But tests have not yet permitted a final decision.

A few words upon the question of the low recovery of ammonia with the direct process. When Mr. Curphey first considered this matter, he was rather of opinion that the uncontrolled use of ammonia in the purifiers was responsible in great measure for the low yield. Further investigation, however, appears to have modified this view. It has been found that the stills are too often worked with little regard to the need of maintaining a regular and adequate supply of lime to the "fixed" section, and generally that the due regulation of the steam and the efficient working of the condenser receive too little attention. Examination of the effluent spent liquor revealed that very serious loss of ammonia was taking place at certain works, that this ammonia was chiefly present in the fixed form, and that insufficiency of lime was responsible. When it is found that no less than the equivalent of 3 to 5½ lbs. of sulphate of ammonia per ton of coal carbonized is being run to waste, this accounts for a good deal of the deficiency as compared with the ordinary system of working; and yet the operation of the stills is not a difficult matter even for unskilled men. There is another point bearing upon this matter. Mr. Curphey asks the question whether there is justification in assuming a regular figure as a standard of 28 to 30 lbs. of sulphate of ammonia per ton in the absence of reliable data regarding the actual amount of ammonia that leaves the retort? Of course, there is not. Some of the small works using the direct system probably obtain coal that is not the best for either primary or secondary product making purposes. But it is economical for them to do so. Just now, too, with the large percentage of inert material that is being sent out with (and as) coal, most works are finding both quantities and qualities of products suffering severely. It is only fair to bear these conditions in mind; at the same time Mr. Curphey has found that there is a substantial loss of ammonia in the direct system which is subject to remedial measures. There is indebtedness to him for taking up this matter in conjunction with the more general one of purification, connected with which there are several matters that require elucidation, but which have so far been neglected by the gas industry.

Gas Composition Inquiry.

A very interesting statement was incidentally made by the Chairman of the South Metropolitan Gas Company (Mr. Chas. Carpenter, D.Sc.) at the meeting of the proprietors last Wednesday. It had reference to the inquiry that the Board of Fuel Research are making, at the request of the Board of Trade, into the subject of the composition of gas, having regard to current and future requirements, the need for certain bye-products, and other features of gas-supply development. There is a probability, which we rather suspect amounts to a certainty, that the South Metropolitan Company will be very closely identified with the inquiry, and that they will be entrusted with the plant with which the investigation will be made at one of their works. The Board of Fuel Research could not do better. The Company have laboratories and a chemical staff second to none; and an investigation of the kind is one that is after the Chairman's own heart. Whatever his predilections regarding gas supply may have been in other times and in other circumstances, new conditions have opened up new considerations. The Board of Fuel Research have in its composition technical men noted for thoroughness; and the research will without question be a far-reaching one.

The "Gas-Controller" Canard.

Someone appears to have been hoaxing the "Evening News." Perhaps our electrical friends or the coal merchants have had a hand in it; but we hope they have not been so silly. Last Monday our evening contemporary gave a front-page place to the statement that the extent to which gas for cooking purposes has been used this summer in London in place of coal, and the prospect of more gas being consumed for heating during the autumn and winter, may lead to the appointment of a Gas Controller. While the Government, it was stated, were anxious to see gas employed for cooking and heating, as well as lighting, there is no desire to see it wasted. There has not been much opportunity for "waste" this summer. People must cook; and the price of food has exercised a restraining influence on the quantity cooked. There has been no need for heating; and the Summer Time Act has kept down the consumption for lighting. What has happened is that the saving-up of coal for winter has led to kitchen coal ranges being used less, and the gas-cooker more, which is in compliance with the request of the Ministry of Munitions, and fits in with the plans for winter of the Coal Controller. The more people use gas, the greater the output of coke for fuel and of other secondary products for munition and agricultural purposes. As to the waste, the visits of the meter readers and the account collectors will prevent this going on to any great extent. But the fact remains that, however wastefully gas may be used, the coal that is carbonized to produce it cannot, in present circumstances, be said to be wasted. Those who know the facts and the character and extent of national requirements know best that this is so. It will have been observed that the paragraph in the "Evening News" is not an official announcement, and that it did not appear in other papers. And, so far as can be gathered, there is no truth whatever in the suggestion as to the probable early appointment of a Gas Controller.

The Government and Petroleum Supply.

Information was quoted in our editorial columns last week which does not give to users of oil (the gas industry among them) any very great hope regarding the prospect of increased importations in anything like the probable rate of new demand; and, as a matter of fact, the time looks like having an unpleasant proximity when, unless something unforeseen happens, America may come to the conclusion that, as charity begins at home, its best course will be to conserve its stores of oil for home consumption. Petrol consumers are getting fidgety regarding not only the present position, but the outlook; for they can see the rapid output of motor cars in America—the absorption of petrol there is already big—putting them in a pretty predicament. The British Government, too, have awakened to the fact that they should do something in the way of making this country as oil-producing as possible, in order to reduce our reliance upon importations. They should begin at the point of least resistance by encouraging in every possible way the existing coal-carbonizing industries. The encouragement so far does not strike one with any noticeable force. But now the Government are contemplating surveying the country and drilling it for petroliferous areas. The Secretary of State for the Colonies (Mr. Walter Long) last Wednesday introduced the Petroleum (Production) Bill, which contemplates giving the necessary authority to expend money for the purpose. The House does not require the importance of the question urged upon them. The importance is well known. But

members were interested in learning that, in connection with this matter, Mr. Long has secured the services of Sir Walter Egerton, Sir Evan Jones (Controller of Petrol Supplies), and Prof. Cadman. Also that the Colonial Secretary has made up his mind that the worst features of the American development of natural oil supplies shall not be repeated here. That development has been accompanied by a prodigious waste of capital, a premature depletion of the oil-fields, and a terrible waste of oil owing to competitive drilling. It is hoped to pass the Bill into law on the re-assembling of Parliament after the recess.

LIMITATION OF GAS AND ELECTRICITY SUPPLIES IN GERMANY.

No Final Stipulation Yet.

We are enabled to publish this week—through the help of the correspondent to whom reference was made last week, p. 269—two translations of further articles in a German newspaper dealing with the projected limitation of gas and electric lighting in Berlin.

EXTRACT from the "VOSSISCHE ZEITUNG" of AUG. 4.

Limitation of Lighting.

The President of Police informs us as follows: "The increasing shortage of coal makes it necessary to limit the use of gas and electricity as much as possible in dwelling-houses and flats. In agreement with the Government Commissioner for electricity and gas, I urgently request that all lamps that can be dispensed with be put out of use, and that those that are indispensable be lighted only as long as absolutely necessary. All lighting which merely serves for pleasure or comfort must cease. I hope and expect that this warning will be observed by all; so that decrees, the non-observance of which will be punishable by fine, may be avoided."

Further, the President of Police orders that the limitation of interior lighting in hotels and guest-houses be applicable also to the bedrooms. Accordingly, the lighting of the bedrooms of hotels must only amount to one-fifth that of the middle of December, 1916. The electric lamps put out of use are to be taken out of their sockets and put in a place of safety by the proprietor. The table and bedside lamps may remain.

These stipulations come into force on the 15th inst.

EXTRACT from the "VOSSISCHE ZEITUNG" of AUG. 5.

Gas Limitation—No Final Stipulations Yet.

Up to the present, there exist only the general lines of guidance published by the Government Commissioner (Professor Kübler) on the 26th of July. The local detailed conditions, which are left to the special confidential officers—subject, of course, to the approval of the Government Commissioner—are still wanting. It is, indeed, not so easy to make uniform stipulations for Greater Berlin which will suit all cases.

The inconsiderate execution of the orders to limit the quantity of gas in private houses by one-fifth of what it was formerly would undoubtedly occasion many hardships. Those who have already observed a warning given last year to "Save your Lights in the Interests of the Fatherland" will find it very difficult to go still further in this direction.

The Government Commissioner has referred to the great increase in the consumption of gas caused by the limitation of the central hot-water supply. But in many households hot water—think of the dish-washing, &c., to say nothing of the weekly bath—is absolutely indispensable. Such increased consumption, which simply arises from the fact that the landlord has raised no protest against the partial cessation of the hot-water supply which he is under contract to furnish, is now to be especially liable to a fine of 50 pfg. per cubic metre for every metre used in excess of the quantity allowed.

Well-to-do people are not likely to be specially affected by the limitation of the gas supply. Let us glance at the following figures: At present there are in Berlin 237,700 coin meters, which have each an average annual consumption of 303 cubic metres. There are besides 301,200 ordinary gas-meters with an average annual consumption of some 390 cubic metres. In addition there are 24,000 consumers with an average consumption of 3300 cubic metres. This shows clearly that the Corporation works chiefly serve small consumers. In consequence of the shortage of coke and other combustibles, small householders in Greater Berlin have taken to using gas; likewise they have exchanged the petroleum for the gas lamp.

It has long been pointed out by experienced technical men, who certainly would not favour an extravagant consumption, that gas-rationing is absolutely unnecessary. The gas-works—especially those of Greater Berlin—could supply all reasonable demands if the mines did not first of all supply, and in full measure, their coke-ovens. At the time of the greatest scarcity of coke in Berlin, Westphalia had a stock of 1,800,000 tons. It is to be hoped that a change will be made in this direction.

However, we must now rest content with gas rations. On account of the poor calorific value of the gas, the authorities have decided on a limitation to the extent of 10 p.ct. They will also, as far as possible, pay some regard to the wishes of the work-women. The protraction of the discussion certainly tends to prove that they will, as far as it goes, meet the wishes of the consumers.

PRICES OF GAS TO DIFFERENT CLASSES OF CONSUMERS.

The Lea Block-Rate System.

In a paper presented to the Missouri (U.S.A.) Association of Public Utilities, Mr. J. E. M'Leod enlarged upon the difficulties connected with the preparation of equitable and uniform rates for various public services, and described a system adopted by the gas companies at Laclede and some other places, known as the "Lea Block-Rate System." While simple and easily understandable by the consumer, in its final form, the preparation must have involved elaborate analysis of working expenses and conditions of consumption—including as it did many debatable estimated charges.

The difficulty mentioned—due to the fact that scarcely any two consumers require precisely the same service in all respects—is obvious to those concerned in the supply, but not generally appreciated by the public, whose ideas of fairness are limited to "one price for all alike," regardless of the many varying factors of expenses in one case as compared with another. The point was illustrated by examples from the postal, railway, and telephone services. The gas consumer may be close to the gas-works or miles distant. He may draw on a comparatively small service and meter, for the full delivery capacity during twelve hours out of the twenty-four, or have a large long-service supply and a 200-light meter to serve as a mere stand-by. Such conditions had a marked effect on the actual cost of each individual consumer, and were independent of the quantity of gas consumed. That one uniform price did not meet all modern business requirements, was shown by the common use of differential prices, based on the quantity used, or on the nature of the consumption.

These facts had led to the consideration of the possibility of preparing price schedules founded on fair and scientific principles, and on the basis that each consumer should pay all the expenses incidental to his individual demand, *plus* a fair return on the capital outlay. Such a system had been developed by Mr. Henry L. Lea, of Chicago, and was adopted as a means of eliminating many of the inequalities in the customary methods of charge—offering as it did substantial inducement to increase of consumption and hours of burning, and avoiding the complaints of discrimination that arose when a different price was charged for the same product according to the purpose it was applied to.

The customers were divided into the smallest possible number of classes, according to capacity of service as compared with the maximum hourly consumption; and the cost of service to each class was ascertained by a full analysis of the working expenses. There may be some difference of opinion as to procedure, but the methods followed in the Milwaukee case could be safely followed. The chief difficulty would be the fixing of a fair return on capital outlay, which was put at anything between ¾ and 10 p.ct., according to the interests or prejudices of those concerned, but had been recognized by Congress as 8 p.ct. Seeing that a fixed rate of profit offered no inducement to the Company for the improvement of existing conditions, he suggested that excess profits, if earned, might be equally divided between the consumers, the shareholders, and the employees.

An average sum sufficient to cover the fixed charges and cost of manufacture, would give a fixed initial or minimum charge for each group. Expressed in terms of 1000 c.ft. of gas, this was called the initial volume, and was followed by a secondary volume, usually common to all classes of consumers. The production and profit having been covered, any excess could be supplied at a much lower price—thus encouraging increased consumption, and the spreading of it over longer hours. The initial volume was based on a load factor and the size of the meter; and for convenience there might be four groups, as shown by the following scheme adopted at Laclede:

Charges for Gas Used Through One Meter in One Month.

Initial volume, 75 c. per 1000 c.ft.; secondary volume, 55 c.; all additional consumption, 45 c.

Group I. would include consumptions of 200 c.ft. per hour or less; Group II., 200 to 800 c.ft.; Group III., 800 to 2000 c.ft.; Group IV., 2000 to 3000 c.ft. The initial volume would be respectively, 7800, 11,100, 20,300, and 37,400 c.ft.; and for a meter capacity over 3000, add 1000 c.ft. for each 100 c.ft. additional capacity. The secondary volume to be 6800 c.ft. in all groups.

A scheme prepared for one district, on this system, is peculiar to it, and not applicable to others in which the conditions might be quite different.

South Metropolitan Company's Issue of Redeemable Preference Stock.—In another part of to-day's issue will be found particulars of the issue by tender of £250,000 of 5 p.ct. redeemable preference stock of the South Metropolitan Gas Company. Tenders (to be sent in by Friday next) must be at or above the issue price fixed by the Directors—94 p.ct. The stock will be redeemed by the Company at par on Dec. 31, 1924, and will rank next after the debenture stock of the Company from time to time existing or authorized.

COMPARATIVE WORKING RESULTS OF THE TWO METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED JUNE 30, 1917.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	7,480,980	1,912,579	1,417,013	1,356,531	1,314,023
Increase . . . . . per cent.	12·09	8·05	9·74	17·10	·03
Gas made per ton of coal . . . . . cubic feet	12,498	13,745	12,694	11,900	12,648
„ „ per gallon of oil . . . . . „	..	574	480	638	614
Gas unaccounted for . . . . . per cent.	2·26	7·98	5·09	8·32	5·13
Coke made for sale per ton of coal . . . . . cwt.	10·14	11·29	10·67	8·82	8·49
Tar made per ton of coal . . . . . galls.	9·67	10·53	8·58	..	8·76
Liquor made per ton of coal . . . . . galls, 8 oz.	40·72	35·26	27·77	32·64	..
Percentage of coke used as fuel	17·41	13·13	14·65	29·41	29·85
Capital expended per 1000 cubic feet sold during the past year	s. d. 8 2·60	s. d. 8 4·60	s. d. 7 6·85	s. d. 8 8·97	s. d. 9 0·84
Price charged per 1000 cubic feet	2/8	2/8 and 3/-	2/0 to 3/6	2/10 to 4/7	2/8 and 3/9
Costs per 1000 Cubic Feet of Gas Sold.					
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.
Coals, oil, &c.	28·09	26·93	27·78	29·36	25·73
Less residuals—Coke and breeze	11·97	9·23	10·78	9·32	6·25
Tar	2·82	1·87	2·30	1·40	1·16
Amm. liq. and sulph. amm.	3·00	2·35	1·58	2·04	·68
Total residuals	17·79	13·45	14·66	12·76	8·09
Net for coals, oil, &c.	10·30	13·48	13·12	16·60	17·64
MANUFACTURE—					
Salaries	·70	·50	·38	·52	·27
Wages—carbonizing	1·88	1·80	2·17	1·58	2·34
Purification	·48	·25	·20	·58	·32
Repairs—plant	4·05	3·68	4·15	3·63	4·36*c*
Net manufacture	17·41	19·71	20·02	22·91	24·93
DISTRIBUTION—					
Wages and salaries	·78	·90	1·17	1·31	·77
Repairs—Mains and services, &c.	1·23	1·22	1·44	1·39	1·82
„ Meters and prep. meters and fittings	1·66	1·95	·62	1·56	1·70
„ Stoves—ordinary and prepayment	1·07	1·61	1·16	1·23	1·07
Total net manufacture and distribution	22·15	25·39	24·41	28·40	30·29
Public lamps—lighting and repairing	·46	·44	·43	·46	·12
Rents, rates, and taxes	2·52	2·19	1·08	1·78	1·17*d*
MANAGEMENT—					
Directors, Auditors, and salaries (Secretary, &c.)	·22	·32	·50	·67	·42
Collectors.	·62	·97	·42	·48	·49
Stationery and general charges	·53	·57	·54	·31	·42
Profit-sharing	·47	·31	·28	·22	·09
Bad debts	·03	·03	·06	·03	·02
Law and parliamentary charges	·02	·01	·03	·07	·07
Superannuations, &c.	·45	·34	·31	·37	·41
National Insurance	·13	·08	·08	·06	·04
Active service allowances and war bonus	3·34	·45*a*	3·28	2·53	1·56
Sundries	·04	·01	·02	..	..
Total expenditure (*less* residuals)	30·98	31·11	31·44	35·38	35·10
GAS	31·78	31·76	30·16	36·94	34·82
Rentals—Meters and prep. meters and fittings	3·36	2·68	2·59	2·00	1·80
Stove	1·31	1·81	2·36	1·77	4·08
Incand. mantle maintenance	..	·10	·12	..	·03
Miscellaneous	·05	·00	·01	·03	·07
Total—Gas, rentals, &c.	36·50	36·35	35·24	40·74	40·80
Balance, being profit	5·52	5·24	3·80	5·36*d*	5·70
Dividend and interest	6·66	7·18	6·05	6·24	5·05*e*
Surplus or deficit	Def. 1·14	Def. 1·94	Def. 2·25	Def. ·88	0·65
Contributions to funds and sundry payments	..	..	..	..	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	28 1·62	27 11·55	27 5·68	..	26 9 15
Coke realized per ton of coal	11 8·97	12 11·43	11 11·14	10 4·06	9 5·74
Coke „ „ of coke	23 2·10	22 11·27	22 4·32	23 5·20	22 4·08
				Per Yard.	
Breeze „ per ton	3 11·39	3 0·31	6 2·30	2 7·49	2 7·28
Tar realized per gallon	0 3·50	0 2·76	0 3·17	0 1·88	0 2·14
Amm. liquor, &c., realized per butt (8 oz.)	7 11·54	10 3·09	7 3·80	7 7·66	..
Percentage of stoves at rental to consumers	102	76	97	108	72
Bad debts per cent. on total receipts	·06	·07	·11	·05	·03
Net profit per cent. on ordinary capital	3·60	2·80	2·68	3·98*b*	4·86
One penny variation equals in half year	£31,171	£7969	£5904	£5652	£5475
Carburetted water gas, per cent. on total make (Including Blue Gas, if any.)	..	27·30	16·73	20·59	36·77

a Active Service Allowances only.

b Tonnage Allowance 1915-16 eliminated.

c Including 0·73 to Renewal Fund.

d Rent and Rates only.

e Including 0·62 Income-Tax item.

COMPARATIVE WORKING RESULTS OF THE TWO METROPOLITAN AND THREE OF THE SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1916.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

		South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.
Gas sold	thousands	806,691	142,484	125,803	198,054	364
Increase (variation equal to)	per cent.	11·37	7·02	7·77	12·71	**11·31**
Gas made per ton of coal carbonized	cubic feet	249	**188**	**430**	**1,068**	447
Water gas made per gallon of oil used	,,	..	74	25	128	40
Gas unaccounted for	per cent.	·47	·23	·15	4·30	·35
Coke made for sale per ton of coal	cwt.	·82	·23	·86	·79	·67
Tar made per ton of coal	galls.	·45	·75	·80	..	..
Liquor made per ton of coal	galls, 8 oz.	·43	4·83	8·46	3·59	..
Percentage of coke used as fuel		7·32	1·79	6·87	3·95	3·04
Capital expended per 1000 cubic feet sold during the past year		s. d. 0 3·60	s. d. 0 1·37	s. d. 0 1·93	s. d. 0 10·81	s. d. 0 8·16
Price charged per 1000 cubic feet†		0 2·00	0 4·00	0 1·00	..	0 5·00
Costs per 1000 Cubic Feet of Gas Sold.						
REVENUE ACCOUNTS.						
Coals, oil, &c.		d. 3·14	d. 5·92	d. 7·81	d. 4·51	d. 5·11
Less residuals—Coke and breeze		1·27	1·12	1·56	·66	**·11**
Tar		**·06**	·62	·81	·10	·03
Amm. liq. and sulph. amm.		·20	**·04**	**·49**	**·09**	**·31**
Total residuals		1·41	1·70	1·88	·67	**·39**
Net for coals, oil, &c.		1·73	4·22	5·93	3·84	5·50
MANUFACTURE—						
Salaries		**·04**	**·01**	·09	**·04**	**·01**
Wages—carbonizing		**·04**	·17	·27	·30	·22
Purification		·21	·08	**·01**	·32	**·07**
Repairs—plant		·92	·18	·88	·38	1·15
Net manufacture		·52	4·28	5·40	4·80	6·79
DISTRIBUTION—						
Wages and salaries		**·05**	·06	**·06**	**·18**	**·03**
Repairs—Mains and services, &c.		·05	**·20**	**·58**	**·35**	**·06**
,, Meters and prep. meters and fittings		1·27	·04	·44	**·95**	·00
,, Stoves—ordinary and prepayment		·42	·06	**·58**	1·46	·01
Total net manufacture and distribution		1·17	4·24	3·74	1·86	6·71
Public lamps—lighting and repairing		**·08**	·04	**·04**	**·09**	**·19**
Rents, rates, and taxes		·45	·40	**·15**	**·11**	**·02**
MANAGEMENT—						
Directors, Auditors, and salaries (Secretary, &c.)		**·02**	**·02**	**·03**	**·09**	**·01**
Collectors		**·02**	·18	**·06**	**·05**	·03
Stationery and general charges		**·09**	**·06**	**·08**	**·08**	·07
Profit-sharing		·19	·01	**·08**	**·04**	**·34**
Bad debts		**·03**	·01	**·02**	**·01**	·01
Law and parliamentary charges		**·02**	·00	·03	·07	**·03**
Superannuations, &c.		**·17**	·00	**·06**	**·15**	·09
National Insurance		·03	·01	·00	·00	**·01**
Active Service allowances and war bonus		1·78	·09	1·69	1·23	·44
Sundries		·00	·00	·00	..	..
Total expenditure (*less* residuals)		·85	4·90	4·94	2·54	6·75
GAS		**1·81**	1·07	1·32	**·12**	7·00
Rentals—Meters and prep. meters and fittings		·00	**·11**	**·21**	**·25**	·01
Stove		**·10**	**·05**	**·10**	**·09**	**·10**
Incand. mantle maintenance		..	**·01**	·00	..	**·05**
Miscellaneous		·00	·00	**·02**	**·01**	·00
Total—Gas, rentals, &c.		**1·91**	·90	·99	·47	6·86
Balance, being profit		2·76	**4·00**	3·95	3·01	·11
Dividend and interest		·11	·88	·69	·80	**1·09**
Surplus		2·65	3·12	3·26	2·21	1·20
Contributions to funds and sundry payments		·72	..	·25	..	·79
SUNDRIES.						
Coals cost per ton		s. d. 3 8·98	s. d. 2 5·17	s. d. 5 5·53	s. d. ..	s. d. 3 4·72
Coke realized per ton of coal		1 4·12	0 6·96	0 7·98	0 3·07	0 10·96
Coke ,, ,, of coke		0 10·29	1 5·63	2 9·81	2 5·39 Per Yard.	3 7·74
Breeze ,, per ton		3 0·20	**1 6·67**	2 10·08	0 4·31	0 1·48
Tar realized per gallon		0 0·16	0 0·92	0 0·92	0 0·07	0 0·60
Amm. liquor, &c., realized per butt, 8 oz.		0 9·50	0 2·47	**0 6·93**	**0 10·36**	..
Percentage of stoves at rental to consumers		2	3	4	7	1
Bad debts per cent. on total receipts		**·05**	·03	**·07**	**·03**	·00
Net profit per cent. on ordinary capital		**2·06**	**2·90**	**4·42**	**2·04**	**·47**
One penny variation equals in half year		£3362	£594	£524	£825	£2
Carburetted water gas per cent. on total make (Including blue gas, if any.)		..	**5·27**	**3·71**	7·76	5·79

† These figures show the variation in price in the Companies' principal areas.

ELECTRICITY SUPPLY MEMORANDA.

The Beckenham Urban District Council have made a confession. The wonderful virtues of electricity have their market price, and this market price is one that is below the maximum charge authorized by Parliament, and in many areas to-day below the cost of production. And the Beckenham Council openly make the dismal admission that, if they charged sufficient to meet the costs of production (including capital charges), it would so reduce consumption as to cause a still higher charge to fall upon the rates. A techy business is this of electricity production and supply; and an immoral one too, seeing that, even in these times when everyone is bearing heavy costs induced by the war, the municipal conductors of it say to the ratepayers who do not consume electricity: "You are, whether or not you like it, to pay part of the costs of providing electricity for your neighbours." We ask again what would happen if the supply were in the hands of a company? Simply that they would have to raise the price in order to get profits for a dividend. When it is remembered what companies would have to do, we wonder whether the Beckenham argument is not more a feeble excuse than anything else for not doing something that is disagreeable to the Council. If so, then they have to face the fact that it is more pleasant for them to do something that is unjust. And who can dispute the injustice of compelling one man to pay part of the cost of supplying a commodity to another man? The Local Government Board recommended the Council to raise the charge to the consumers rather than impose the deficits upon the ratepayers generally—including the South Surburban Gas Company, who, with their customers, stockholders, and co-partners, have their own heavy war burdens to bear. The Chairman of the Company (Mr. Charles Hunt) has his personal views on the subject of whether or not Beckenham electric light consumers can afford to pay for their own electric energy [see *ante*, p. 287] All we can say is that, if they cannot do so, then there is not a residential area to-day in which an electric supply company could possibly earn even a fraction of 1 p.ct. dividend.

Cost of Production and the Charge.

There appears to be a feeling of disquiet within the electrical industry as to what is going to be the outcome of the proceedings of the Board of Trade Electric Power Supply Committee; and all the interests concerned are now extremely eager to have their views placed before the tribunal, though just recently all were extraordinarily anxious to impugn, and did impugn, the judicial competence of its composition. According to the London County Council, the Committee are not going to fritter away their time, and spread the hearing of evidence over an unconscionable period. The Council believe that the taking of evidence will be concluded by the end of September; and so they are convoking a conference of the Metropolitan Borough Councils owning electricity concerns. The British Empire Producers' Association have been circularizing Chambers of Commerce on the subject. The Association consider that the class that deserves the prior consideration of the Committee are the manufacturers throughout the kingdom, whose business is likely, they submit, to be affected in international competition by the efficiency and the cheapness or otherwise of electrical power distribution. We think that ratepayers have an equal right to "prior" consideration, and that they should be protected once and for all against any part of "cheapness" being derived from compulsory contributions from their pockets. However, various chambers of commerce and manufacturers have been invited to support the Association, who hope to be able to present a memorandum to the Board of Trade Committee with such a strong backing that the Committee will be anxious to have from that body more detailed statements, probably from an influential deputation representing important groupings of industry. Last week in the "Memoranda," there were references to what other bodies are doing. It will not be a nice job for the Committee; it will be much worse than the one Mr. Justice Astbury recently had in hand in deciding whether or not Hackney's 20 p.ct. allowance of current for lighting to power consumers at power rates at the peak of the lighting load was giving them preferential treatment over other lighting consumers whose lighting consumption is equally beneficial to the undertaking, but is charged at a higher rate per unit. The various bodies concerned will want the Departmental Committee to jump as each one desires. But they cannot all have their own way; and this fact gives piquancy to the situation.

Uneasiness and Preparation.

As recently seen, the Board of Trade Committee have been subjected to the passing penchant of the electrical industry for administering hearty kicks. The Incorporated Municipal Electrical Association have also come in for a share. There have been sharp charges that this body—in the hour of trial, and when malformation in the industrial growth is alleged—has shown an utter emptiness in the matter of a declared policy. It should, it is urged, have given an early leading. But it did not do so. Now, through Mr. H. Faraday Proctor, the Hon. Secretary of the Association, the Council have made known their views to the members; but the members will only recognize in what is presented a réchauffé of certain more or less respected notions and desires. The Council seem to be high and dry in the matter of initiative or fresh suggestion. They urge there should be publication of the report of the Board of Trade Electrical Trades Committee and of that of the Coal Conservation Sub-Committee of the Reconstruction Committee. There is a lot of pother about the publication of the two reports, and yet there is free acknowledgment that their contents are pretty well known in the electrical profession, and have been privately well sifted to see what (if any) good there is in them. The "good" is doubtful, if "Meteor," of the "Electrical Times" [who has evidently been holiday making lately], was really serious when he wrote: "When these poor reports emerge from their bathing machines in nothing but their little bathing-drawers, the crowd on the beach will be much less inclined to salute than to duck them." However, the Council of the Association favour the appointment of a Central Board or Commission to take over the whole of the duties at present exercised by the Board of Trade, Local Government Board, and other departments, so far as they relate to the administration of the Electric Lighting Acts. Such a Central Board, it is urged, should not be authorized to own or operate electricity works. It should be a progressive body, with the interests of the industry at heart, should have complete control (subject to Parliament alone) over all such matters as the granting of powers, approval of rates of charges, formulation of rules, &c. Members should be whole-time officers, and should not hold securities in electrical undertakings. There is nothing original about this idea; it was trotted out for inspection now quite long ago at a meeting of the Institution of Electrical Engineers; and it is not a plan that commends itself wholly to those who have had experience of *ad hoc* governing Boards or Commissions of the kind. The public utility companies of the United States do not give them an unqualified good character; but the one thing that can be said favourable to them is that they do conduce to the co-ordination of legislative enactment.

The I.M.E.A. Council Speaks.

Passing from this the Council, like a good many other electrical men, favour large power stations, controlled and operated by District Boards, consisting of representatives appointed by the present statutory undertakings, with distribution remaining with the existing concerns. It is a far cry from the present state to the visioned one; and there is a large amount of capital that blocks the way. But not all electrical men are friendly to this line of development, nor are all municipalities. Many of the latter are rather in favour of their undertakings continuing self-existent from the generating end to the distribution and selling end, and not to have the municipal body simply reduced to the position of "middle men" between large generating plants and the consumers. The argument of those who advocate large generating units—but who appear to be poorly informed as to the financial issues that such stations will entail if situated long distances from the areas of consumption—is that individual considerations must give way to the need for economical production. But there are those who think that economical generation by concentration away in the coalfields is going to be largely negatived by the expenses of distribution; and, if coal carbonization is going to be amalgamated with the generating plant, then there will be still further complication in respect of costs which will modify seriously, by new and untried conditions being imposed, the anticipated economy. The Council of the Association put the matter thus—"They are convinced that, in order to secure a large and economical supply of electrical energy, it will be necessary to adopt centralized generation with large units of plant, and that the interests of all parties concerned will be best met (so far as generation and transmission are concerned) by advocating joint control and operation by District Baards." They add that "in the event of the status or remuneration of an official of any undertaking being adversely affected through the formation of a District Board, such an official shall be entitled to compensation." If they can get compensation, this would perhaps meet the views of some present-day engineers. But to what will concentration of generating plants, and the institution of District Boards assuredly tend, if not to fully qualified electrical engineers being required in very limited number. There will most certainly be a gradual decline of needs in the matter of technical attainments for all but the few; and, for local distribution and sale of current a man of much-reduced training and status will suffice. There will be very good reason then for producing further economy by amalgamating municipal gas and electricity departments; and where gas companies exist, it would be an easy matter for them to take over from the municipality the distribution and sale of electricity. Electricity generating plant concentration, if brought about (though necessarily gradually), looks promising for extinguishing the electrical industry as a separate organization. It is stated that Mr. Faraday Proctor is going to give evidence for the Incorporated Municipal Electrical Association before the Departmental Committee; and he would like any special information that members think should be in his possession. Among information the Council desire to have has regard to a complaint that plant extensions by municipalities are being refused by the authorities, while power companies appear to be favoured. Gas undertakings have a still stronger case. While they are being urged to supply more and more tar, benzol, and toluol, they are held back by capital and labour restrictions—at the same time knowing that the electric power companies are receiving undue preference

Centralization and Effects.

in this matter, although many of them are shovelling bituminous coal under their boilers, so destroying the products of which the Ministry of Munitions are in urgent want. Our masters help to add, by their vagaries, to the strangeness of this much troubled world of ours.

Glasses and Injurious Rays.

The electrical people do not like one to talk much of such things as ultra-violet and infra-red rays. Notwithstanding research work, they do not (or say they do not) believe they have much actual existence in electric lights. Still the "Electrician" thinks it worth while to refer to a very useful paper by Mr. W. Coblenz, issued by the United States Bureau of Standards, describing representative groups of glasses, designed to protect the eye from ultra-violet, visible, and infra-red rays. We appropriate this information from Mr. Coblenz's paper as furnished by our contemporary: Ultra-violet rays, in excess, are known to be prejudicial to eyesight, and appear to have a chemical effect, penetrating to the deeper recesses of the eye. Infra-red rays and heat, which may also be injurious, seem to affect only the outer regions of the eye, and their influence appears to be essentially thermic. Their effect requires consideration in connection with furnace work, where they are, possibly, reponsible for cataract. The group of amber-coloured glasses is effective for the suppression of ultra-violet rays. Among the Crookes glasses, the sage green and pale blue varieties are useful as a protection against infra-red rays, and transmit a fair amount of visible light. A thin coating of gold has the same effect; but the transmission of visible light is not so good. The Crookes neutral tinted glasses enable objects to be perceived in natural colours, and have a high transmission in the visible, but are not so successful in stopping infra-red energy. Other varieties, such as the greenish brown, besides protecting the eye from ultra-violet rays, also check the infra-red rays to some extent. For furnace work, bluish green and sage green glasses, which are a protection against infra-red rays, and yet enable the workmen to see the molten surfaces, are useful. On the other hand, for working molten quartz, for searchlight work, and for operating oxy-acetylene or electric welding, very dark glasses—*e.g.*, of the green and yellowish green varieties—are needed in order both to block the ultra-violet and infra-red radiations, and to protect the eye against the high visible intrinsic brightness.

PERSONAL.

Mr. R. Scott, the Assistant Manager at Cowdenbeath, Fife, has been appointed Manager at the works of the Kilmalcolm Gas Company.

Mr. James Mitchell, the Engineer and Manager of the Montrose Gaslight Company, has been appointed Chief Assistant to Mr. Alex. Yuill, the Engineer and Manager of the Dundee Corporation Gas Department.

Captain W. Donald Cheshire, who has been presented by the King with the Albert Medal of the second class, for gallantry in saving life, is the son of Mr. William Cheshire, a Director of Messrs. Parkinson and W. & B. Cowan, Ltd.

The Board of Trade inform us that they have appointed Mr. W. J. Atkinson Butterfield, M.A., F.I.C., Assoc. Inst. C.E., as one of the Metropolitan Gas Referees in succession to Mr. A. Vernon Harcourt, F.R.S., who has intimated to the Board that he does not desire to accept re-appointment on the expiration of his present term of office on Sept. 1 next.

In a recent re-organization of the Ministry of Munitions Inventions Department, we learn that Mr. W. G. Head, of the South Metropolitan Gas Company, has been appointed Director of the Works Section. Mr. Head has been connected with the Inventions Department for several months. He was previously engaged as South-Eastern District Manager of the Metropolitan Munitions Committee.

Mr. Frank Sutcliffe Townend, of the Birmingham Gas Department, has gained the B.Sc. (Engineering) degree of the London University. He entered the service of the Birmingham Gas Department as junior draughtsman under Mr. J. Hewett, the Distribution Engineer, in June, 1911; and in December, 1914, he was transferred to the engineering staff at the Nechells works, where he is still engaged under Mr. E. B. Tomlinson, the Engineer. Mr. Townend also holds first class certificates in the Honours Grade in both "Gas Engineering" and "Gas Supply."

According to Reuter's New York correspondent, negotiations have virtually been completed for an amalgamation of the National Carbide Union and the Carbide and Air Reduction Companies, which are capitalized at £40,000,000. The latter concern possesses plant for extracting nitrogen and oxygen from the air.

An official list of American manufacturers of coal-tar products includes (according to the "Chemical Trade Journal") the names of 158 manufacturers in the United States producing: Coal-tar crudes, 23; intermediates, 70; artificial dyestuffs, 99; vegetable dyestuffs and extracts, 18. Then 16 firms produce 841,200 gallons of benzol, toluol, xylol, and phenol; 20 produce 6,186,000 lbs. of naphthalene, carbolic acid, &c.; 20 produce 5,821,650 lbs. of intermediates; 17 produce 1,138,100 lbs. of artificial colours; and 11 produce 6,678,500 lbs. of vegetable dyestuffs and extracts.

A FEW INTERESTING DATA CONCERNING COKE.

By George Frederick Zimmer, Assoc. M. Inst. C.E.

When coke is quenched in quantities of 4200 kilos. in 11 c. metres of water, 3 c. metres of the latter are evaporated with each quenching; and these 3 c. metres will have to be made up by fresh water admitted to the tank. This leaves the quenching water at a temperature of about 165° C., if the fresh water has been taken from the main. In such a quenching process, the coke is only superficially cooled—a piece the size of a fist will still be of a dark red inside. If such coke is allowed to evaporate its surplus water through the inner heat, it becomes practically dry; and the hotter the quenching water has been, the drier will be the coke. The water should enter the coke receptacle, not from all sides, as is usually the case, but merely from the bottom, as in this way only is the water forced completely through the mass of coke, which should finally contain between 7 and 8 p.ct. of moisture. The larger lumps are, however, drier than the smaller; the difference being between 1 and 2 p.ct.

According to Herr B. Ludwig, of the Munich Gas-Works, a coke-quenching plant of the above capacity will cost £2500 for fifteen ovens (each of a capacity of 6000 c. metres per day), with, together, a capacity of 90,000 c. metres. The cost of repair should be taken at 4 p.ct., which figure leaves a margin of safety. In order to draw all the fifteen ovens, seven hours were occupied by seven gas workers and seven labourers, which, apportioned per charge, worked out at 2·662d., or 0·69d. per ton. The expenses for electrical current per charge are 1·2d. per K.W.-hour, or 0·291d., KW.-hour per ton of coke. The quenching water consumption per charge is 3 c. metres, or 727 litres per ton of coke.

The breakage of coke through fall, if it contains much water, is less than for dry coke. Thus when the coke contains 13 p.ct. of moisture, it is not nearly as friable as when containing 7 to 8 p.ct. If coke with 7 to 8 p.ct. of moisture, of $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. size, is turned over once with a coke fork, 1 p.ct. is reduced sufficiently small to pass through a $\frac{3}{8}$-in. mesh. If the same coke, but $2\frac{1}{2}$ in. to 3 in. in size, is treated in the same way, 3 p.ct. of it will pass through a $1\frac{3}{8}$ in. screen, and $1\frac{1}{4}$ p.ct. will pass through a $\frac{3}{8}$ in. screen. Coke with 13 p.ct. of moisture will, in the latter case, contain 2·8 p.ct. of the larger, and 0·82 p.ct. of the smaller coke. An experiment made with coke containing 7 to 8 p.ct. of moisture gave the following results in breakage when dropped respectively 20, 40, 60, and 80 inches:

Height of Drop.	20 in.		40 in.		60 in.		80 in.	
Size of small coke after drop . .	$\frac{3}{8}$–$1\frac{1}{4}$	0–$\frac{3}{8}$	$\frac{3}{8}$–$1\frac{1}{4}$	0–$\frac{3}{8}$	$\frac{3}{8}$–$1\frac{1}{4}$	0–$\frac{3}{8}$	$\frac{3}{8}$–$1\frac{1}{4}$	0–$\frac{3}{8}$
Coke $2\frac{1}{2}$ in. to 3 in. size	5·6	0·77	5·6	1·45	8·2	1·5	8·2	1·8
Coke $\frac{3}{4}$ in. to $1\frac{1}{4}$ in. size	—	0·70	—	0 80	—	1·0	—	1·2

For coke with 13 p.ct. of moisture the breakage will be 40 to 50 p.ct. less. Screened coke, $2\frac{1}{2}$ in. to 3 in. in size, after being filled into sacks with a fork contains 3·3 p.ct. of small coke passing through a $1\frac{1}{4}$ in. screen; coke of $\frac{3}{4}$ in. to $1\frac{1}{4}$ in. size after treating in a similar way contains 0·77 p.ct. which passes through a $\frac{3}{8}$ in. screen.

Grabbing dry coke of $2\frac{1}{2}$ in. to 3 in. size with a 4 c. metre "Hone" single-chain grab caused a breakage of 10·5 p.ct. of $\frac{3}{8}$-in. to $1\frac{1}{4}$ in. size, and 3·46 p.ct. which would pass a $\frac{3}{8}$-in. screen. When small coke of $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. was grabbed in the same way, it afterwards contained 2·35 p.ct. of coke passing through a $\frac{3}{8}$-in. screen. These figures include the "small" produced by the grab, and the material both in the grab and that left by the grab. It is, therefore, a record of the total breakage caused.

Coal Factors' Profits.

The negotiations (says the "Iron and Coal Trades Review") between the inland coal factors and wholesale merchants on the one hand and the Coal Controller on the other, regarding the prices to which the traders are entitled during the war, are still in progress. At the moment, the main features of the terms under consideration include the following maximum margins over and above the delivered cost: (1) Locomotive railway coal for steam-raising, 3d. (2) Railway coal for other purposes, 6d. (3) Supplies for national factories, 6d. (4) Supplies for gas and electric undertakings, 9d. (5) Supplies of house coal to retail merchants for distribution, 1s. (6) Other coal purchased in lots of 10,000 tons or more, 1s. (7) All other coal (according to quantity), 1s. 6d. to 2s. This is regarded as a very unsatisfactory and unfair scale in many respects—from the factors' point of view, seeing that, apart from the cost of transport, it is to include all office and other expenses, which alone are more than sufficient to absorb the smaller allowances in the majority of cases, and that where the coal passes through the hands of more than one factor or merchant before reaching the consumer or retailer, the amounts in question are to be divisible between them. Our contemporary adds: "It is fully expected, therefore, that these terms will undergo important revisions before a final settlement is arrived at."

THE "DIRECT" PROCESS FOR THE MANUFACTURE OF SULPHATE OF AMMONIA.

From the Annual Report of Mr. W. S. Curphey, the Chief Alkali Inspector.

To-day another portion is published of the statement [*ante*, p. 281] by Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, 1906, in his report for 1916, regarding the further study during the past year of the "Direct" process for sulphate making in gas-works.

Working Temperature of Purifiers.

Experience shows that temperature readings taken by means of thermometers inserted at various points in the gas-mains afford a very imperfect guide for the control of purifier working when the system is exposed to the weather. Not only do the boxes differ in temperature one from another, and one grid from its neighbours, but extensive cooling takes place at the lids and sides of the boxes and in the mains themselves, and in some works further disturbance is caused by the neighbourhood of steam-pipes. It was therefore arranged to take daily readings of the temperature of the oxide itself by means of thermometers attached to metal rods sliding in fixed tubes. Suitable tubes (¾-in. diameter) were first of all inserted through the sides of the boxes. But they were difficult of access in this position; and it was subsequently found better to arrange the tubes vertically, each with its upper end attached to the central fixed plate in the purifier cover, and its lower end resting on one of three grids and embedded in the oxide. The thermometer carriers were lowered until the pointed end of the carrier enclosing the bulb entered the oxide, and the tops of the fixed tubes were then closed with screw caps to prevent the escape of gas. With thermometers so arranged, readings have been taken by one of the works staff at a fixed hour each day, and the results co-ordinated and recorded in graphical form.

Interpretation of the results is not easy. The temperature of the oxide on the bottom layer is in part governed by the steam-pipe placed below the bottom grid. The excess temperature in that layer over that of the entering gas does not, therefore, afford an exact indication as to the intensity of the chemical reactions that take place in the oxide. The rise of temperature of the middle layer, on the other hand, is not subject to the same disturbance, and affords a better indication of the progress of purification. The top layer of oxide is also unaffected by steam. But here the cooling effect of air on the sides of the box is powerfully reinforced by that of the lid; and a fall of temperature is generally noticeable in the top layer. Moreover, moisture condensed on the purifier lid, and dropping back on to the oxide, may well reduce its temperature. It is not an uncommon thing to see water lying on the top layer of oxide when the boxes are opened in the "Direct" process, and the oxide in contact with the sides of the boxes is often noticeably wet.

Special importance, therefore, is attached to the temperature of the middle layer, and in graphs prepared a curve was added, the ordinates of which correspond to the excess temperature of the middle over that of the bottom layer from day to day. Taking the various experiments in order.

Experiment No. III.—(Table B.) *Purifier Lids Unprotected by Covers:*

First purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	+ 8° C.
Average change of temperature—middle layer	+ 7° C.
Average change of temperature—top layer	− 0·5° C.

Differential curve.—Middle layer is steadily active throughout.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 2° C.
Average change of temperature—top layer	− 1·5° C.

Differential curve.—Middle layer begins to act on the ninth day.

Experiment No. VII.—(Table B). *Purifier Lids Lagged and Covered:*

First purifier: Direct temperature readings:—

Average change of temperature—bottom layer (includes steam)	+ 12·5° C.
Average change of temperature—middle layer	+ 6° C.
Average change of temperature—top layer	− 5° C.

Differential curve.—Middle layer becomes markedly more active on the eleventh day.

The temperature of the bottom layer in its rise and fall seems to show general correspondence with that of the inlet gas, but very little with the curve showing the make of gas. Rate of flow seems to have little effect on temperature.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 8° C.
Average change of temperature—top layer	− 3·5° C.

Differential curve.—Middle layer becomes active on the third day; its activity markedly increases on the thirteenth day.

The temperature curves given in the graphs above referred to all relate to normal conditions of work (gas passed 12·1 to 19·3 million c.ft.); the graphs referred to later relate to a period of disorganization (5·1 million c.ft., Experiment VI., Table A). The same oxide was used in all cases—a mixture of two-thirds fresh bog ore with one-third old spent oxide (55 p.ct. sulphur, dry basis).

Experiment No. VI.—(Table A). *Purifier Lids Unprotected.*

First purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	+ 10° C.
Average change of temperature—middle layer	+ 5·5° C.
Average change of temperature—top layer	− 6° C.

Differential curve.—Middle curve is active throughout. A marked increase of activity is noticeable on fourth day.

Second purifier: Direct temperature readings:

Average change of temperature—bottom layer (includes steam)	—
Average change of temperature—middle layer	+ 0·5° C.
Average change of temperature—top layer	− 2° C.

Differential curve.—Middle layer begins to operate on the second day.

The question arises, Is any guidance afforded as to the progress of purification by graphical records such as those cited above? Do they enable one to anticipate periods of disorganization? So far as present experience goes, the results appear to be of quite a negative character. Undoubtedly, rise of temperature favours purification; but a suitable temperature by itself is insufficient to secure regularity of working. Indeed, in every case, good and bad, the oxide was maintained at the desired temperature by means of steam. Other factors clearly operate, as pointed out in the report for 1915. Moisture, rate of flow, ammonia and oxygen content of gas, absence of soluble salts of iron, and the proportion of sulphuretted hydrogen itself—all these are important factors, and, in addition, the physical character of the oxide (apart from humidity) has to be taken into account.

An attempt has been made in the two tables that follow to co-ordinate the data relating to periods of good and bad working, in the hope that guidance may be afforded thereby for the conduct of operations elsewhere. Analysis of the data yields results of positive value. It would appear:

First.—That in every case failure of the purifiers occurred when the make of gas was on the increase—at the end of the period.

Secondly.—That the use of fresh and highly moist oxide is attended with risk when it coincides with periods of maximum make of gas; and an exceptional amount of ammonia is needed at such times to maintain the oxide in a neutral condition. It is confidently believed that when the oxide has become drier and is better matured, results will show improvement. Fresh oxide should be stocked and brought into condition during the summer months.

Supply of Ammonia to the Purifiers.

The best method of controlling the supply of ammonia to the purifiers in the "direct" process has been the subject of special inquiry at "Works E," as elsewhere. At "E," there is no rotary washer, and reliance has had to be placed on a bye-pass. A 2-in. bye-pass was first provided from the inlet to the outlet of the bubbler. At a later date, it was decided to try the effect of admitting ammonia to the second purifier as well as to the first, and a second 2 in. bye-pass was added from the gas-main entering the bubbler direct to the purifiers, with branch pipes admitting gas to the bottom and top of the first purifier, in the expectation that sufficient ammonia would thus be made available in the lower layers of the second purifier to neutralize any soluble salts of iron that might be formed there. In addition to these two pipes, the whole of the crude gas has been bye-passed from one to three hours a day during the winter months to activate the highly moist bog ore that had to be charged. Recently [in February, 1917] a further change has been made. The second 2-in. bye-pass has been connected direct to the ammonia pipe from the virgin liquor still to obtain a supply of strong gas for emergency use in the second purifier. Exact control of ammonia in the "direct" process is always a matter of difficulty. The ammonia content in the crude gas entering the bubbler is governed by the volume and temperature of the virgin liquor that separates in the hydraulic main and condensers, and when a long main is in use between the bubbler and purifier, as at "Works E," condensation, accompanied by absorption of ammonia, takes place to a very notable extent. Thus, from the 100 yards of main at "Works E" no less than 40 gallons of weak liquor are pumped per day (with about ·60 of "free" and ·46 of "fixed" ammonia per 100 parts, equal to about 5 grains of ammonia per 100 c.ft. of gas) when the two stills are at work, and 10 gallons when they are idle. A rotary or other form of washer is also subject to disturbance as the vapour tension of ammoniacal liquor varies with the temperature: Thus, coal gas leaving a coke scrubber fed with gas liquor, containing 1·95 parts of "free" ammonia per 100 parts, at 12° C. (53° Fahr.) contained 18 grains of ammonia per 100 c.ft. of coal gas; at 8·5° C.

(47° Fahr.) it contained 6·5 grains of ammonia per 100 c.ft. of coal gas.

Control by test, therefore, is the only satisfactory procedure; and for this end a number of aspiration experiments were made

Table A.—Condition of Purifiers during Periods of Disorganization.

—	Experiment No. I.	Experiment No. II.	Experiment No. VI.
Period	Oct. 24/16 to Oct. 31/16	Oct. 31/16 to Nov. 8/16.	Jan. 15/17 to Jan. 24/17.
Number of days	7	8	9
Gas passed:			
Millions of cubic feet	3·6	4·0	5·1
Rate per 24 hours, c.ft.:			
Whole period	518,000	540,000	565,000
At end of period	536,000	560,000	630,000
Average gas passed per sq. ft. superficies per 24 hours	890	930	970
Steam below bottom grids	All boxes	All boxes.	All boxes.
Ammonia bye-passed			
2-in. bye-pass inlet to exit bubbler	Open	Open.	Open.
2-in. bye-pass to second purifier	—	—	Open.
All gas bye-passed	—	1 hour per day.	1 hour per day.
Oxide of iron as charged to			
First purifier	New bog ore.	New bog ore.	⅔ new; ⅓ old.
Second purifier	New bog ore.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Fouled oxide:			
Character	Neutral.	Neutral.	Neutral.
Soluble iron	Trace on one grid.	Present on two grids.	Present on all grids.
Temperature:			
Coal gas entering .°C.	17 } 5°C.	18 } 4·5°C.	14 } 7°C.
,, ,, leaving .°C.	12 }	13·5 }	7 }
First purifier—average, all grids:			
Whole period .°C.	27	34	25·5
At finish .°C.	23	32	25·5
Second purifier—average, all grids:			
Whole period .°C.	30	27	25·5
At finish .°C.	32	27	29
Fourth purifier—top layer .°C.	18·5	16·5	14
Excess temperature of middle over bottom layer—Average °C.:			
First purifier	+ 5·5	—	+ 5·5
Second purifier	—	+ 1	+ 0·5

Table B.—Condition of Purifiers during Normal Periods of Working.

—	Experiment No. III.	Experiment No. IV.	Experiment No. V.	Experiment No. VII.
Period	Nov. 8/16 to Nov. 30/16	Nov. 30/16 to Dec. 21/16	Dec. 21/16 to Jan. 15/17	Jan. 24/17 to Feb. 27/17.
Number of days	22	21	25	34
Gas passed:				
Millions of cubic feet	12·1	12·2	15·3	19·3
Rate per 24 hrs., c.ft.:				
Whole period	551,000	580,000	612,000	568,000
At end of period	577,000	653,000	640,000	600,000
Average gas passed per sq. ft superficies per 24 hours.	950	1000	1050	980
Steam below bottom grids	All boxes	All boxes	All boxes	All boxes
Ammonia bye-passed:				
2 in. bye-pass to main	Open	Open	Open	Open
2 in. bye-pass to second purifier	—	Open	Open	Open
All gas bye-passed	1 hr. each day.	1 hr. per day.	1 hr. per day,	2 hrs. to Feb. 10; then 3 hrs. per day.
Oxide of iron as charged:				
First purifier	⅔ new bog; ⅓ old oxide	⅔ new; ⅓ old.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Second purifier	⅔ new bog; ⅓ old oxide	⅔ new; ⅓ old.	⅔ new; ⅓ old.	⅔ new; ⅓ old.
Fouled oxide:				
Character	Alkaline, one grid.	Neutral	Alkaline, two grids.	Alkaline, three grids
Soluble iron	Trace on two grids.	Trace on one grid.	Absent	Absent
Average moisture (all grids), p.ct.	30·9	16·2	7·7	22·0
Temperature:				
Coal gas entering °C.	15·5 } 2°C.	13 } 3°C.	14·5 } 4°C.	14·5 } +1°C.
,, ,, leaving °C.	13·5 }	10 }	10·5 }	15·5 }
First purifier—average, all grids:				
Whole period °C.	28	30	30	29
At finish °C.	23·5	27	24·5	33
Second purifier:				
Whole period °C.	25	25·5	29·5	31
At finish °C.	30	24	25·5	33
Fourth purifier—top layer—°C.	15·5	13	14	21
Excess temperature of middle over bottom layer—average °C.:				
First purifier	+ 7	+11	+9·5	+6
Second purifier	+ 2	Nil	—2	+8

to ascertain the amount of ammonia actually entering the purifiers with the various bye-pass taps under control.

First test, Oct. 11, 1916:

2-in. bye-pass from inlet to outlet of bubbler—half open.
Virgin liquor still working; cyanide still idle.
Temperature of coal gas leaving "bubbler," 36° C.
,, ,, ,, entering first purifier, 20° C.

Ammonia—Grains per 100 C.Ft. of Gas.

By aspiration test:

At exit from bubbler, and before admission of bye-pass	9
At inlet to purifier after admission of bye-passed crude gas and passage through main (100 yards)	9

Hence, the added crude gas exactly compensates for the 5 to 6 grains of ammonia removed by condensation in the main.

Second test, Oct. 17, 1916:

2-in. bye-pass open as above.
Virgin liquor and cyanide stills both working.

	Ammonia—Grains per 100 C.Ft. of Gas.
Coal gas leaving bubbler, 12 to 1 p.m., 22° C.	2·3
,, ,, ,, 2 to 3 ,, 40° C.	2·3
Coal gas entering purifier, 3.30 to 4.30 p.m., 17° C.	6·7

In this case the added crude gas more than made up for the ammonia removed by condensation.

Third test, Oct. 26, 1916:

2-in. bye-pass, above named, closed: V/l still alone working.
2-in. bye-pass from inlet bubbler to purifiers, full open.
(*a*) Branch pipe to gas-main entering bottom of the first purifier.
(*b*) Branch pipe to gas-main entering side of first purifier close to lid.

	Ammonia—Grains per 100 C.Ft. of Gas.
By aspiration test:	
Gas entering bottom of first purifier—	
Cock (*a*) three-quarters open } ,, (*b*) half open }	4·2
Both cocks shut	1·7

Hence, the crude gas bye-passed through the cock (*a*), three-quarters open, adds about 2½ grains of ammonia (per 100 c.ft.) to the inlet gas. The amount entering the top side of the first purifier through the cock (*b*), half open, is here unknown.

Fourth test, Oct. 30, 1916:

2-in. bye-pass, above named, closed.
2-in. bye-pass from inlet of bubbler to purifiers, full open.
(*a*) (*b*) Branch pipes in use as above.

Virgin liquor and cyanide stills both at work; water on Liebig increased.

	Ammonia—Grains per 100 C.Ft. of Gas.
By aspiration test:	
Gas entering bottom of first purifier—	
Cock (*a*) open; cock (*b*) closed	3·8
Cock (*a*) open; cock (*b*) open	2·8

Hence cock (*b*) admits about a grain of ammonia per 100 c.ft. of gas to the top of the first purifier, when cock (*a*) is fully open. This amount of ammonia, though doubtless sufficient for summer periods of working, is wholly insufficient when purifiers are pressed in the winter; and on occasions, as above stated, the whole of the crude gas has had to be bye-passed for a limited period each day. The effect of bye-passing a small volume of strong ammonia gas from the still has yet to be determined.

Losses of Ammonia.

The most serious sources of loss undoubtedly occur at the still and at the bubbler, when crude gas is bye-passed in any quantity. Loss at the still, as already stated, is mainly due to deficiency of lime. The following tests are representative of the results obtained at these works:

—	Ammonia, per 100 Parts of Spent Liquor.			Calculated Loss of S/A. Lbs. per Ton of Coal.
	Free.	Fixed.	Total.	
1.—(*a*) Lime feed defective.	·007	·653	·660	5·0
(*b*) ,, ,, ,,	·009	·440	·449	3·0
(*c*) Better feed; reduced flow of liquor	·030	·005	·035	0·3
2.—Lime feed repaired	·0025	·0003	·0028	0·02

The loss due to bye-passing of gas is more difficult to control, and in the winter months, with wet fresh ore in use, must be serious. Thirteen grains of ammonia per 100 c.ft. of gas correspond to about 1 lb. of sulphate of ammonia per ton of coal carbonized. In the summer months 2 to 3 grains of ammonia appear to be ample. In the winter months hitherto, 15 to 20 grains of ammonia have been required.

The loss at the still is clearly preventible, if suitable qualitative tests are regularly applied, as they should be. The loss at the purifiers is in part preventible, and would be greatly reduced were it possible to maintain the oxide in a fit condition. It would be of assistance, were it possible, to admit ammonia separately to the

various layers and devise a simple qualitative test to determine the condition of the oxide from day to day. The matter is now engaging attention. It may prove possible to sample the gas at various points in the purifier and note the effect on turmeric or litmus paper, or to combine a temperature and sulphiding test in such a way that small test samples of the oxide are allowed to remain in contact with the gas at various levels—the samples being withdrawn for examination from time to time.

(To be concluded.)

GERMAN GAS ASSOCIATION—PRESIDENTIAL ADDRESS.

(Concluded from p. 274.)

Quality of the Coal Supplies.

In the conditions prevailing, it is little wonder that consideration of the quality and price of the coal supplied has taken a back place. Gas-works were glad to get the coal, and made small complaint that frequently it had little in common with gas coal. War is a hard task master, and, in this time of shadow, working results have fallen off—smaller makes, a reduced yield of coke, poorer gas, &c., have been the rule. Interruptions of the coal supply, and consequent limitation of gas consumption, together with the inferior quality of the coal, have had a damaging effect on the gas-coke market. The export trade in coke has been interfered with. There were many attendant evils. Owing to its bad quality, more coal had to be carbonized and more settings kept in action; there was greater wear and tear on the apparatus; good coke for heating the retort-settings was not available, neither was good lubricating material for conveyors, &c. Last year some of these points were mentioned; but, contrary to our hopes, things have gone from bad to worse.

As to price, long consultations resulted in an increase of 2s. a ton being conceded to the coal factors on Jan. 1 last. The Association endeavoured to ward off the impending evil, and, in conjunction with the German Municipal Conference, presented a petition to the Prussian Minister of Commerce and Industry begging that fresh heavy financial burdens should not be imposed on gas-works, as they would involve a reduction in output, which was an event directly opposed to the interests of the community as well as of the conduct of the war. The remonstrances of representatives of consumers have, however, been in vain. A second increase of 2s. per ton came into force on May 1, quite unexpectedly and so suddenly that there was no opportunity of opposing it.

Increase in Gas Consumption.

The output of gas in the year 1916-17 still shows an increase over the preceding year and the pre-war period, though from the middle of December last it has been unfavourably affected by the compulsory limitation of consumption. How great has been the effect of this may be realized from the following figures for the output of gas in Lubeck, which are typical of other places also: In January to April, 1916, there was an average increase of 25·3 p.ct. over the preceding year. In May to September, 1916, the increase was 15·9 p.ct.—the effect of the introduction of "Summer Time" being here noticeable. In October to December, 1916, the increase averaged 15·1 p.ct.; while in January to March, 1917, it was only 6·3 p.ct.

Labour.

The question of *personnel* has occupied us very much during the past year. It assumed a more serious character as days went by, and all serviceable hands were relentlessly taken for military service. Feeble old age and untrained youth are inefficient substitutes, and our works have now to be content with the not exactly lovely, if interesting, motley mixture of soldiers, prisoners of war, Belgian civilians, and other types of people, or ultimately with the "eternal feminine." We have to carry on with these, not of our own accord—for that has ceased to be—but merely to meet the pressing needs of the time.

So far as the supply of fitters is concerned, the courses of instruction at various centres have been useful, and have helped to fill many gaps. For instance, the courses at Dantzig give qualifying instruction for plumbers, smiths, and brass-fitters, while there is a secondary school training in gas and water fitting for men invalided out of the army, and courses for prisoners of war, arranged by Professor Bunte in collaboration with the Baden Agricultural Department. At the instance of Herr Reinhard, of Leipsic, the Association presented a petition to the War Labour Department of the Ministry of War, asking for a supply of suitable labour for the retort-houses. The following reply has been received: "As the Acting District Commanders have been already reminded by special instruction that gas and water works are to receive every consideration in regard to labour, it is considered unnecessary to make any further general order. In particular cases of pressing need, whether for officials or men, immediate application should be made to the District Commander; and if this proves unavailing, a request should, if necessary, be directed to the War Labour Department."

Effect of the War on the Price of Gas.

Last year it was pointed out that an effect of the war would be an almost universal increase in the price of gas. This is due to war influences that are constantly becoming more tangible—such as the difficulties and expense of coal supply, the sequestration of stocks and materials, and the rise in wages and prices of materials. While formerly, however, it was merely a rise of a few pence per 1000 c.ft. in order to keep the gas-works on something like the same basis as in peace time, and to meet the considerably increased expenses, now totally different influences are coming into play. Instead of a small demand—made, indeed, unwillingly—there are now an imperative order and compulsory measures of a most incisive and disagreeable kind. Any reasonable tariff is scoffed at, and gas-works are compelled to make gas so dear that a considerable falling off in its consumption is inevitable. The measures vary; but one or two examples may be cited. At Crefeld, the charge for any gas consumed in either November, December, or January which is in excess of the consumption in October is 17s. per 1000 c.ft. At Nauheim Bad, the ordinary charge is 4s. 6d. per 1000 c.ft.; but for any quantity in excess of three-fourths of the quantity consumed in the same period of the preceding year, £1 8s. 4d. per 1000 c.ft. is charged.

In view of these far-reaching changes and impending burdens, it is a vital question what is to be done to balance their ill-effects and ensure the commercial or industrial success of gas-works in future. There are certainly limits to increases in the price of gas or in receipts from residuals; and to reductions of working expenses, and other sources of equalization, economy must be looked for. One that appeals especially to me has been indicated by Herr Schäfer, of Dessau, in an article in "Wasser und Gas," in which he advocates the co-operation of adjacent gas-works in order to avoid energy being frittered away to the disadvantage of gas supply as a whole.

Gas and Water Department.

Obviously wisdom dictates sensible economy of materials, and new construction should be undertaken only where its necessity, purpose, and economy are patent. Such considerations have led to the establishment of a "Gas Department," recently enlarged to a "Gas and Water Department." Started, at the instance of the Building Revision Department, by the War Office, it is intended to be a technical consultative office, with the following objects: (1) The support of measures for maintaining the productive capacity of existing plant; (2) co-operation for the purpose of supplying gas, by extensions, new construction, joint working, &c.; (3) revision of plans for construction and extensions; and (4) furnishing technical information on other services competing with public gas-works.

This is yet another department in a time of over-organization; but, nevertheless, it must be hoped that its work will prove of value to all.

Taxation.

Unfortunately, necessity has compelled new ideas of taxation to be accepted; and it was not surprising that coal, notwithstanding its considerable price, has been marked down for a heavy tax. The coal-tax, which has been adopted by the Imperial Parliament, amounts to 20 p.ct. of the selling price of the coal at the pit head. It was impossible to oppose the tax successfully. The Empire wants money, which everyone must help to provide. We must all be content, therefore, to settle lines for its proper incidence, and to keep in touch with the Imperial Treasury in regard thereto. The Treasury, after prolonged consideration, adopted the following basis of working—viz.: "With gas-works and coke-oven works the burden imposed by the tax is to be placed on gas and coke in the ratio of the proceeds from the sale of the gas and coke disposed of by the gas or coke works." This plan did not tally fully with the views of the Special Committee, which was of opinion that ordinary gas-works should pass the tax wholly on to the chief product—viz., gas—and leave untouched by it the bye-products which are dependent on the state of the market. Also that coke-oven gas supplied to gas-works, being a bye-product of the coke-works, should not be increased in price on account of the tax. Coke-oven works should shift the burden of the tax on to the coke delivered by them. It transpired, however, that the Treasury would not adopt any formula of this kind either in the decree itself or in the regulations for applying it. Consequently, it was necessary for us to restrict our efforts to obtaining simplicity and uniformity in the procedure for settling the incidence of the tax. A petition has been presented to the Federal Council asking that there should be only the following Courts of Arbitration in the matter—one for gas-works making their own coal gas, one for gas-works which receive coke-oven gas, and one for water-works. The request was also made that the Courts should be composed of technical men nominated by our Association. In order that the proper incidence of the tax may be well thrashed out, suggestions are invited by the Council of the Association.

The traffic tax also has been imposed; but gas-works are not directly affected by it, as an increase in the loading allowance takes away its effect.

Taxation is a ticklish matter; and neither the Association nor its Taxation Committee must be blamed if the gas industry becomes more deeply affected by it than at present. The Committee have carefully followed the trend of events, and are ready for all eventualities. They are keeping in touch with the corresponding Committee of the Union of Electricity Works, as it is most desirable that the representatives of both forms of energy—gas and electricity—should unite, both for the sake

of strength and to direct any taxation on right lines equally for both as far as may be.

Organization and Representation of the Industry.

The important questions of economies of working of gas undertakings which the war has raised have directed attention to the organization of the industry. Naturally, there has been some overlapping of the activities of the German Association of Gas and Water Engineers and those of younger bodies, such as the Central Gas Bureau, the Commercial Union of German Gas-Works, &c. But the more important and essential it is to have a good organization, the more difficult is it to solve the question of securing it. In no sphere is greater care requisite in order to avoid errors being made and decisions arrived at the consequences of which it will be difficult subsequently to make good.

The Council of the Association have for a long time past discussed this question of organization. The only positive result so far has been that three members—Herren Körting and Lempelius, for the gas industry, and Herr Kummel for water supply—have been entrusted with the representation of the Association's interests in the capital of the empire in all matters requiring urgent decisions during the war. This delegation of powers was absolutely essential at the present time. The authority of the three members is limited to matters of extreme urgency, and they are to act in the closest possible concert with the Council and President of the Association. Of another aspect of the matter, there is no doubt that after the war a thorough revision will be necessary on such questions as the location and duties of the Technical General Secretary of the Association, who should preferably be in Berlin (instead of at Carlsruhe, as at present) as the centre of its activities, the office of the "Journal für Gasbeleuchtung" (now edited at Carlsruhe and published at Munich), the location of the Association's Instructional and Experimental Works, and the relations of the Association with the colleges, especially that at Charlottenburg. Efforts, moreover, have been made recently to clearly define the relationships of the various technical gas institutions, and to lay down more clearly their respective spheres of activity. An article published towards the close of last year proposed that these spheres should be defined as follows—viz.: The German Association of Gas and Water Engineers should have purely technical-scientific aims; the Commercial Union of German Gas-Works should concern itself with purely industrial matters and trade in bye-products; while the Central Bureau for Gas Propaganda should represent the interests of the gas industry as a whole, and maintain relations with the authorities throughout Germany.

The writer of the article contended that the proposed division of work was supported by the statutes of the three bodies. While the advantage of clear distinction of their functions cannot be overrated, it is nevertheless questionable whether the Statutes of the Association at least are in keeping with the limitation suggested. It is doubtful if the Association could unreservedly hand over to another body the study of practical questions in the gas industry, which it has hitherto carried on. Anyhow, the question must be examined thoroughly in order to see that the position of the Association as the fully representative body of the gas industry is not wrongfully challenged. In order to be prepared for dealing with this question, the Council have appointed a Committee, chiefly composed of past members of Council, to consider it without bias, and to report what organization will best meet the future needs of the German gas industry.

The Gas Industry Outside Germany.

The ill-effects of the war on the gas industry have been more marked abroad, especially in the countries at war with Germany, than at home. A deplorable state of things prevails in countries dependent on English export of coal. Want of ships' space, the enormous rise in the price of coal, and high freights have made their supply almost impossible. Italy and France have been badly hit—especially Venice, Genoa, and Milan. Sometimes any gas consumption has been prohibited, sometimes the price of gas has been increased sevenfold, sometimes the works have made a considerable loss. You know our chief enemy—England—has suffered under deprivations, shortage of material, high prices, and serious wage struggles. The proud Briton sees things developing badly for him; and the knowledge is dawning gradually on him that war is not always a magnificent business. The Germans await the end tranquilly—our submarines are at work. They will attain their object, in which we descry a just retribution. This is not the place to say more. We will not emulate the English technical men, who prefaced the retrospect on the year 1916, in the English "Journal," with political reflections which had nothing to do with our industry, but which, as a contributor to the German Journal observed, bore testimony to their one-sided and strong feeling of self-righteousness and real English hypocrisy. In it Germans were reproached invidiously for placing might before right, displaying cowardice and treachery, and committing every kind of atrocity; the "ludicrous" peace offer of the German Empire was branded as fantastic stage-play, and covered with scorn and derision; and the exploits of our submarines and air-ships were designated as murder and manslaughter—as the work of barbarians before whom the civilized world shuddered with loathing. Enough! we will not follow the English technical men in this course; it is not the German way. But it is not uninteresting, as a study of national psychology, to observe the effect of the sickness with which the whole world is seized, on those whom we once called friends, and to see how the outlook for mutual human work of culture is dimmed and how racial hatred blinds to all and every reason.

The journal "Chemische Industrie" gathers from papers on England's Commercial War that, according to the English, French, and American Technical Press, the reason of the German superiority in almost all branches of industry is to be found not merely in organization, but in extraordinarily close relations between scientific investigation and technology. We have every reason to rejoice at this correlation. Prof. H. Bunte, our Nestor and scientific leader for many years past, said a year ago that the chemical industry founded on tar showed a double face—one turned towards peace, the other towards war—but that the object of war was peace. Our industry is based on getting the most out of coal, and we may confidently expect that knowledge and experience acquired in the hard times of war will bear rich fruit in peace. I conclude by wishing that this peace, for humanity's sake, may soon come, and that the gas and water industries may be found ready for the great problems that will await them.

INCREASING THE INTERNAL AIR-SUPPLY TO INVERTED GAS-FLAMES.

Alexander's Method.

At the seat of the bunsen flame is the blue or greenish looking inner cone which is the commencing point of combustion so far as the amount of air admitted with the gas will allow. The outer cone is the part where the half-burned gases are more or less completely burned in the outside air—the degree of complete combustion depending upon various factors, such as the pressure and composition of the gas, the amount of air drawn in in relation to the requirements of the gas, the degree of perfection of admixture, and so forth. The progressive character of the combustion from the inner cone to the outside of the flame is disclosed by the experimental temperature measurements that have been made, which indicate that there are great temperature variations relative to the structure of the flame within (as Prof. Arthur Smithells has shown) very small distances.

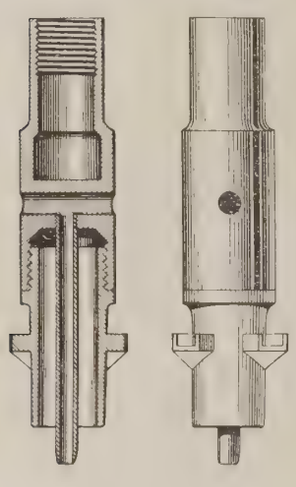
Through the burner itself, the amount of air sucked in has relation to the pressure of the gas; and the greater the pressure, the greater the resistance to firing-back with an increase in the proportion of the air to the gas consumed, but which proportion must be such that the oxygen and the accelerated combustion are equal to overcoming the cooling effect of the nitrogen introduced with the increased quantity of air. Now these various elementary facts show that, with the ordinary incandescent burner, sufficient air is not brought into admixture with the gas without a secondary supply outside the flame to complete combustion, but that, providing the pressure is sufficient to prevent lighting-back, a larger proportion of the air necessary for complete combustion can be introduced into the mixture. The question arises whether there are not means of admitting a larger supply of air, and so primarily better aërating the flame to secure perfect combustion, without setting-up conditions that will cause lighting-back. Various expedients have been put forward—such as multiple cone burners with the air taken in in stages. Even then it was found that in the burner-tube there was not perfect admixture throughout the stream of gas. At the outer part of the stream, there was a larger proportion of air than in the inner part. To change this condition, it will be remembered, burners at one time put in an appearance which employed midget fans for creating perfect admixture. But these increased the cost of the burners, and were constantly going wrong through the effect of the heat upon the lightly made moving part. Now we have introduced to notice a new patented proposal by Mr. C. J. Alexander, of No. 53, Albany Street, N.W., by which he introduces a secondary supply of heated air, independent of that which forms the mixture in the tube, right to the inner surface of the inner cone of the flame—the invention, which is simplicity itself, being specially applicable to inverted burners.

Before, however, further referring to the invention, there is a pertinent, but we are afraid almost forgotten, passage in the lecture which (the late) Prof. Vivian B. Lewes delivered before the Institution of Gas Engineers in 1897, and which may be conveniently brought to light again in this connection. He said:

> The bunsen flame gets from the mixture only roughly one-half the air necessary for its complete combustion—the other portion being obtained from the exterior of the flame during combustion. It is this burning of the gas constituents in two stages that gives the dual character to the flame; the inner cone being due to incomplete combustion at the expense of the previously admixed air, while the outer cone is formed by the combustion of the products of combustion from the inner cone at the expense of the oxygen from the outer air. . . . One of the greatest mistakes which have been made with regard to mantle burners, is that the flame with the mantle has been considered as being the same as the flame without the mantle. A moment of consideration will show the fallacy of this. If a burner be arranged so as to give a satisfactory flame, the combustion will be carried on at the expense of about three-fifths of the total air required, which had been previously mixed with the gas, while at least two-fifths more have to be obtained from the air; and when the flame is burning unchecked, and without a mantle, it obtains

this without any trouble. On placing the mantle over the flame, however, the fine network gets rapidly heated to a high temperature, and the condition of the flame will be entirely altered—the inner zone of combustion, at the expense of the previously admixed air, continuing as before, while the products of this incomplete combustion have to find their way through the meshes of the mantle and burn upon its surface as the hot mantle will prevent the diffusion inwards of the necessary air to complete the combustion below its surface. In order, therefore, to obtain the necessary conditions for a good burner for this purpose, it is necessary to obtain a mixture richer in air before combustion than with the ordinary burner; and, though this is easy to obtain when the gas is under high pressure, the problem offers considerable difficulties when there is only the ordinary town pressure to deal with.

This question of increasing the air supply to the interior of the flame itself, without promoting firing-back of the flame, is therefore one that merits consideration. Mr. Alexander claims that he has succeeded, and, as we have said, by very simple means indeed. The accompanying illustration, showing a section of an inverted burner tube, plainly indicates how he obtains the auxiliary air supply to the interior surface of the hollow inner cone of the flame without setting-up a firing-back condition. Across the burner tube is a small bar through which is a circular channel, opening to the outer air on opposite sides of the tube. From this channel depends a tube centrally placed in the burner tube; and thus—quite independently of the mixture of gas and air in the burner tube itself—the pulling action of the flame draws in a secondary supply of air which is delivered (as said) to the interior surface of the inner cone. Thus the gas and air mixture is delivered to the point of combustion through the annular space formed by the outer and the interior tubes. The obstruction to the stream of mixture has the effect of preventing its inner part being richer in gas than the outer part, and the outer part richer in air than the inner part—in this way promoting more complete mixing. At the same time, the air in the inner tube becomes heated before delivery to the inner cone. There is one point which may be suggested to the inventor; and it is that he should ensure that the inlets to this secondary air supply are carried well out of the path of the uprising products of combustion, so that no part of the spent products of combustion vitiates the air supply drawn in and delivered to the flame. [Since this was written, Mr. Alexander states that he has tested the present position of the air-inlets and the idea of taking them farther afield, and he finds no difference in the flame. Apparently therefore, chemically and thermally, there is no ill-effect.]



With the burner (which the inventor calls the "Oriole") no gas adjustment is found necessary beyond that provided by the tap; and when the tap is turned so that there is no flame noise, the point of maximum intensity is obtained at the mantle. We have witnessed the burner in use—in the large size. The flame itself seen without the mantle points to a highly intense combustion; and by it the mantle is made perfectly and uniformly incandescent in every part. Beyond this we cannot go, as there are not yet available photometrical tests backed by an authority recognized in the gas industry. But what the inventor has aimed at has been to secure perfect combustion, so avoiding the drawbacks of imperfect combustion, a burner which will appeal to the general public for cheapness and simplicity, and one which on a low gas consumption will maintain a high lighting power. The war has stopped the placing of the new burner on the market. With the difficulties with metal supplies, and the commandeering of works and machinery, no one will look at the question of the manufacture of new designs unless they have to do with munitions of war. So with this introduction, we must leave the new burner, await its development in small, medium, and large size, and the proof (by the aid of the photometer, and daily experience) of the higher working efficiency.

Briquettes in the United States.—The output of fuel briquettes in the United States in 1916, according to statistics issued by the Bureau of Mines, was 295,155 net tons, which was an increase of 73,618 tons over 1915, and constituted the greatest production on record. The large increase is attributed both to the improvement in trade conditions arising from the unusual demand for coal, and to the greater appreciation on the part of users of the value of briquettes for household fuel. Improvements have, during the last two years, been made in the process of manufacturing; and the product from many of the plants is said now to give off less of the heavy, tarry smoke to which objection has been taken in the past. Though this improvement appears to have been largely accomplished by the use of asphaltic pitch as a binder, it is pointed out that this advantage possessed by asphaltic pitch may in the long run be off-set by other advantages of coal-tar pitch—such as lower cost, ease of manipulation, and stronger briquettes.

PRIMARY VOLATILE PRODUCTS OF COAL CARBONIZATION.

U.S.A. Bureau of Mines Bulletin.

There has just been issued by the United States Bureau of Mines one of their "Technical Papers" (No. 140), dealing with "The Primary Volatile Products of the Carbonization of Coal." It was written by Messrs. Guy B. Taylor and Horace C. Porter, and is a sequel to Bulletin No. 1. It is very timely, says "Gas Record" [Chicago], in that in the past three years attention has been directed to the volatile products of American coal in a way not heretofore considered attractive in a commercial sense.

The pamphlet consists of 44 pages of matter descriptive of experiments on Pittsburg, New River, Illinois, and Wyoming coals with the results of distillation at low and high temperatures under vacuum and at atmospheric pressure. The effects of slow and rapid heating of coals and the secondary reactions as a result of heating gas and residue from slow, low-temperature carbonization are cited. The recent work of other experimentors is reviewed, says our contemporary, and the following conclusions drawn.

A high-grade bituminous coal of the gas-making type decomposes by heat primarily into paraffin hydrocarbons, and a completely altered non-volatile residue, with small quantities of water, carbon dioxide, and carbon monoxide. The three latter products are the first produced, although in small quantity. From some other types of bituminous coal, they are produced in greater relative quantities than from the gas-coal type. Complex and varied secondary reactions induced by superheating the hydrocarbons, water vapour, and carbon dioxide are of great importance in industrial high-temperature carbonization.

The products of low-temperature carbonization from coal of the Pittsburgh type on an industrial scale at about 800° to 900° Fahr. (427° to 482° C.) will consist of a rich gas amounting to 0·6 to 0·7 c.ft. per pound of coal, and a large yield of oil or tar, comprising 10 to 12 p.ct. of the coal. This tar consists chiefly of paraffin hydrocarbons, is very low in (or possibly entirely devoid of) benzene and naphthalene derivatives, and practically devoid of free carbon. The gas will contain 6 to 7 p.ct. of unsaturated hydrocarbons and 20 to 25 p.ct. of ethane and its higher homologues, and consequently will have a high calorific and illuminating value. The tar may be either redistilled or subjected to cracking processes, so as to produce light oils (gasoline substitutes) whose yield will be greater than, and probably at least double, that obtained by high-temperature carbonization.

The results suggest the possibility that low-temperature carbonization might be utilized in gas manufacture as an enriching process by passing through the low-temperature retorts a relatively large quantity of a thin gas, such as blue water gas, sweeping-out the light oil vapours that are primarily liberated at these low temperatures. The utilization of inferior coals for making gas by such a process may be found practicable.

Based on the experimental results of low-temperature decomposition in a vacuum, the following hypothesis is proposed for the constitution of coal.

All kinds of coal consist of cellulosic degradation products more or less altered by the processes of aging, together with derivatives of resinous substances in different proportions, also more or less altered. These substances are many in number, and closely graded into one another in their nature and composition. They all undergo decomposition on moderate heating. Some, however, decompose more rapidly than others at the lower temperatures. The less altered cellulosic derivatives decompose more easily than the more altered derivatives, and also more easily than the resinous derivatives. The cellulosic derivatives on moderate heating decompose so as to yield water, carbon dioxide, carbon monoxide, and hydrocarbons, giving less of the first three products the more mature and altered they are. The resinous derivatives, on the other hand, decompose on moderate heating, so as to yield principally the paraffin hydrocarbons, with probably hydrogen also as a direct decomposition product.

The more mature bituminous coals with good coking properties contain a large percentage of resinous derivatives, and their cellulosic constituents have been highly altered. The younger bituminous and sub-bituminous coals consist chiefly of cellulosic derivatives much less altered than those in the older coals. They undergo a large amount of decomposition below their fusion points, and (partly for this reason) many of them do not coke.

North British Association of Gas Managers.—The annual meeting will be held in the hall of the Philosophical Society, Bath Street, Glasgow, on Friday, Sept. 7, under the presidency of Mr. J. Lang, the Engineer and Manager of the Vale of Leven Gas Company, Alexandria, Dumbartonshire.

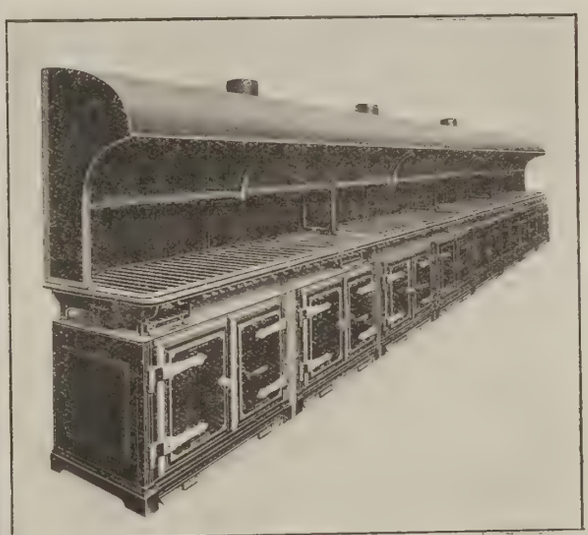
Control of Incandescent Mantles in Germany.—It is reported in the "Ironmonger" that the incandescent mantle industry in Germany will shortly be put under a scheme of rationing, which is expected to have for its first result a reduction of the still very considerable export trade. Even at the present time, German incandescent mantles are sold abroad at lower prices than those ruling in the home market; and it is suspected that large quantities of them reach enemy countries *viâ* neutral States.

BOURNEMOUTH MOTORS ALTERED FOR COAL GAS USE.

Mr. Philip G. G. Moon, the Acting General Manager of the Bournemouth Gas and Water Company, sends a photograph of two of their motors which have been altered for the use of coal gas, and are running quite satisfactorily. He remarks that the change was easily made, and many of the lorry and char-a-banc owners in the district are now altering their vehicles for use with coal gas.

WRIGHT'S CANTEEN GAS APPARATUS.

Messrs. John Wright & Co., of Birmingham, send some photographs of large installations of canteen plant and fittings of exceptional size which they have recently completed.



The first, which is here reproduced, shows a part of one of two kitchens at large munition works in the Midland district. In the foreground are to be seen a carving table and hot closet with three recesses and overhead gear; a central range, having four ovens and extended hot plate and hood; and beyond this a large roaster and a hot closet. In addition to what appear in the photograph, the installation includes: Two "Celt" vegetable and pudding steamers; three vegetable boilers with baskets; a "Cito" griller and toaster on stand; another hot closet similar to that shown; an "Atlas" stockpot and stand; an additional "Sector" hot closet and carving table to that shown in the foreground of the photograph; and three tea boilers. In the servery, which occupies part of a gallery running all round the large dining room where the apparatus is installed, there are also two hot closets and two tea-boilers. The installation also includes ten of the firm's "Canteno" boilers for delivering an immediate and constant supply of boiling water for tea-making purposes.

The second photograph shows a very large range of roasting ovens, with continuous hot plate, plate rack, and hood, which, it is said, forms part of one of the most extensive installations of canteen apparatus ever fitted up in the country. The range here illustrated consists of eight full-sized ovens with double doors; and the length of the apparatus is about 30 ft.

Search for Oil in England.—Discussing the Petroleum Bill recently introduced into Parliament, the "Pall Mall Gazette" says that the opinion of a well-known expert is: "The chances of payable oil-fields being discovered in this country are, of course, speculative. But, then, such enterprises are always more or less speculative. Mining in its initial stages is, in most cases, nothing but a gamble. Herein lies the wisdom of Mr. Long's Bill. Oilfields of uncertain value are known to exist. The Bill eliminates the private speculator. The Government assume the risk, and if they 'strike oil' the country, and not a syndicate of capitalists, gets the benefit. The Bill places in the hands of the Government all rights to petroleum and natural gas. By all means let the State undertake the necessary boring. If payable fields be located, it will be an incalculable boon to the country. Modern industrial development has rendered oil absolutely essential." In the Bill, the expression "petroleum" means all petroleum and natural gas and their relative hydrocarbons (excluding coals and bituminous shales) existing in their natural condition in strata.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Belfast.

After having met for some years in Dublin, the annual gathering of the Association took place last Tuesday in Belfast, when there was a fair muster of members in attendance, to take part in a busy day's proceedings. The meeting was held in the Council Chamber of the magnificent new Belfast City Hall, under the presidency of Mr. A. S. Brook, of Lisburn.

A Welcome to the City.

Sir Crawford M'Cullagh, ex-Lord Mayor, said he was sorry the Lord Mayor was away on an important business engagement. He had asked him to come and express his regret for his absence, and on behalf of the citizens to extend to the Association a warm welcome to the city. The members were there for their annual conference, to take into consideration matters that pertained to the welfare of their different undertakings, which, of course, represented both private and municipally owned concerns. He thought they would be able in Belfast to learn something that would be to their advantage, because the citizens were justly proud of their gas undertaking. He remembered, when he occupied the position of Lord Mayor, he rather took a pride in pointing out to the deputations and visitors who came along what had been accomplished in connection with the gas undertaking; and perhaps it would not be altogether out of place, although it might be ancient history to many present, to say that in Belfast they supplied practically as cheap gas as anywhere in the Kingdom. It was the cheapest in Ireland; and he believed there were only one or two towns in England or Scotland that equalled Belfast in this respect. This seemed to him an extraordinary thing; and, indeed, he had never been able altogether to explain it, having regard to the fact that they had to pay so much for the carriage of gas coal. It went to show that the Corporation had not starved the undertaking. In other words, they had, in his opinion, put in the best possible up-to-date machinery, financed the concern properly, and, above all, it had been well managed. In Belfast, in connection with their municipal trading undertakings, they endeavoured, whenever the need arose, as regarded the managership, to show no favour whatever, but to procure the best possible man—not caring whether he was English, Irish, or Scotch. The result, he thought, fully justified this policy. ["Hear, hear."] The success of their concern was dependent not only on the up-to-date machinery, but also on the management. No matter what machinery one might have, if it was not managed properly it was not going to be a great success. In Belfast, not only did they produce the cheap gas to which he had already referred, but they had been able to give large sums to the relief of the rates. In fact, the hall in which they were assembled was a monument to the Gas Department. The Corporation having secured the best site and the best design for the hall, the Gas Committee said, "We are going to help to pay, so that the burden may not fall altogether on the ratepayers." Therefore the Committee paid interest and sinking fund amounting to £11,300 a year, and they had contributed altogether £168,700 towards the hall. At the end of the sinking fund period the hall would be a free gift to the City of Belfast. There was no ground rent; and it would be absolutely clear of debt. He hoped the members would find their visit interesting; for, apart altogether from gas, there were many concerns in Belfast well worth seeing. They were justly proud of the fact that in the city some of the largest undertakings in the world were to be seen. The manufacture of gas at the lowest practicable price was of the greatest possible importance, not only for ordinary lighting, heating, and cooking purposes, but to enable the industrial concerns to compete with any others of a similar character; and their great aim in Belfast had been to furnish such a supply. At the gas-works, Mr. J. D. Smith, the Engineer and Manager, would be delighted to see the members, and to give them any information he could, because it was only right and proper that every undertaking should obtain what benefit was possible from what had been accomplished in Belfast in the direction of the production of cheap gas. Therefore, he hoped they would be able to spend a short time at the gas-works. He hoped, also, that their visit to the city would prove pleasant, and that they would carry home with them happy recollections of their meeting there. [Applause.]

The President, on behalf of the Association, thanked Sir Crawford M'Cullagh for giving them so hearty a welcome to the magnificent City of Belfast.

The President's Medal.

Sir Crawford M'Cullagh said he had one other pleasant function to perform. He had been asked to present to the President the gold medal which he had in his hand. The gift testified to a great deal of appreciation on the part of the members, and demonstrated that they were perfectly satisfied with what Mr. Brook had done for the Association. He hoped the President would live long to serve the community among whom he resided.

The President, in returning thanks, said that during his residence in Ireland he had been most comfortable, and had been well received wherever he had gone. There was really very little difference between the North of Ireland and his own County of Yorkshire.

Apologies.

Apologies for absence were read from Mr. H. Kirkham (New Ross), Mr. J. Whimster (Armagh), and Mr. J. E. Enright (Tralee).

The Report and Accounts.

The Hon. Secretary and Treasurer (Mr. G. Airth, of Dundalk) then read the report of the Committee. In this, reference was made to the discussion at the last annual meeting on the coal crisis, when it was agreed that the following resolution should be sent to the Board of Trade, the Irish parliamentary leaders, and the public bodies and Press of Ireland.

> "That this meeting, representative of the gas industry in Ireland, views with the gravest apprehension the present condition of coal supply to Ireland, and is convinced, should this condition not be speedily relieved, many of the smaller gas-works and other industries must shut-down, with consequent loss and inconvenience to the public.
>
> "We therefore urge upon the Government the extreme and immediate necessity for adopting such measures as will assure an adequate supply of coal at reasonable prices, including sea carriage.
>
> "That a copy of this resolution be forwarded to the President of the Board of Trade, the Irish parliamentary leaders, and the public bodies and Press in Ireland.
>
> "That a Sub-Committee of three members be appointed to deal with this matter, and if necessary seek an interview with the President of the Board of Trade."

This resolution has practically been adopted by all the parties mentioned, and forwarded to the proper quarters; and though, the Committee stated, it has so far met with no financial success, it may still have good results in the future. The Committee recommended that a donation of £3 3s. be sent to the Benevolent Fund of the Institution of Gas Engineers. The number of ballot papers received shows that many of the members are not taking that interest which is desirable in the Association; and the Committee asked them to take full advantage of their rights in this respect.

The Auditor (Mr. G. W. Norman, of Dublin) then went through the accounts, which showed a balance in hand of £51 16s. 7d. He added that the annual subscriptions were a little bit down; but though the balance-sheet showed a sum of about £10 less in hand, he believed the Secretary had nearly as much as this in hand already for back subscriptions.

Coal Prices and Freights.

Mr. J. Paterson (Waterford), in moving the adoption of the report and accounts, said, with regard to the proposed donation to the Benevolent Fund, this was a very worthy object, and it was a commendable recommendation to come from the Committee. As to the question of coal prices and freights, he would like to ask the Committee if there had ever been any favourable outcome as the result of all the communications they had entered into. So far as he could gather, coal prices were not coming down, but soaring upwards; and as to freights, they were abnormally high. They had increased about 30 p.ct. since this time last year, when the Committee took the matter in hand; so that, while the Committee hoped that good would follow the steps they had adopted, he was sorry the results up to now had proved contrary. The question arose, Could the Association do anything more than they had done in the way of bringing pressure to bear on the "powers that be" to relieve the Irish gas undertakings of this abnormal cost of coal and freights? It was placing all Irish gas-works at a great disadvantage. The Government were appealing to undertakings to produce as much gas as possible, while giving the proprietors no facilities to do so. A great many companies and authorities were limited in the price they could charge; and yet they could not see their way to limit the prices coal-owners could charge for coal, and that ship-owners could charge for freight. It was an unenviable position for the gas undertakings to find themselves in; and the Committee should bring pressure to bear on the authorities. He thought that if the representatives of the larger gas undertakings of the country could be induced to lend their assistance, good might come of it.

Mr. J. Woods (Bishop's Castle) seconded the motion, and referring to freight prices, remarked that a great deal of time had been given to the question, and his own opinion was that, unless the Government took control of the shipping and fixed the rates, the Committee would be unable really to do anything in the matter.

The report and accounts were then unanimously adopted.

Office Bearers and New Members.

Mr. T. Duncan (Glasgow) and Mr. T. Duxbury (Manchester) were appointed Scrutineers; and they reported that the following had been unanimously elected:

President.—Mr. H. Kirkham, of New Ross.
Vice-President.—Mr. H. W. Saville, of Drogheda.
Members of Committee.—Mr. D. M'Intyre, of Dungannon; Mr. R. Kneeshaw, Jun., of Clonmel; and Mr. P. B. Ellacott, of Newry.
Auditor.—Mr. G. W. Norman, of Dublin.
Hon. Secretary and Treasurer.—Mr. G. Airth, of Dundalk.
New Members.—Mr. J. A. Pemberton, of Skibbereen; Mr. M. J. White, of Youghal; Mr. G. Hale, of Kinsale; Mr. Thomas Whimster, of Armagh; and Mr. F. R. Anderson, of Cavan.
New Extraordinary Member.—Mr. F. G. Ambler, of Leeds.

Report of the District Representative on the Council of the Institution of Gas Engineers.

The President said that, as District Representative of the Association on the Institution of Gas Engineers, he had to express regret that he had attended very few of the large number of meetings that had been called. He would venture to say that the Institution of Gas Engineers had never called more meetings for a considerable number of years than in the past one. The twelve months had been crowded with matters of the utmost importance; and the thanks of the gas industry were due to those members of the Institution Council who had ungrudgingly devoted time and energy, especially in the matter of requests and consultations with the Ministry of Munitions. In the annual report of the Council, they referred to the continued and increasing help rendered to the High Explosives Department of the Ministry of Munitions in the essential ingredients in the filling of shells. The most outstanding

feature during the year was the acceptance of the presidency of the Institution by the Rt. Hon. Lord Moulton, K.C.B., F.R.S., who is the Director General of Explosive Supply. He had the pleasure of hearing Lord Moulton's speech in returning thanks to the members of the Institution at the annual meeting in June, and of attending the luncheon given by the retiring President to meet Lord Moulton. His Lordship's high appreciation of the work done by the gas industry, as expressed by him, could not fail to render excellent service to the industry as a whole. The Home Office Committee consulted the Institution with reference to the effect of the Summer Time Act, and expressed their appreciation of the assistance rendered. The Council of the Gas Institution were doing good work for the industry and for the country at large.

The Presidential Address.

The President next proceeded to deliver his Inaugural Address, which will be found in last week's "Journal" [pp. 271-2]. At its conclusion,

Mr. T. Frizelle (Holywood), in proposing a vote of thanks to Mr. Brook, said it was one of the best addresses he had ever listened to. Many points had been touched upon that were of real interest to the managers of small works, especially at the present time, when they were in difficulties in every direction. Of course, the labour question was not so acute with them as it was in England and Scotland, where young men had to join the army. But the high wages that were being paid by the munition works and by the Government had made them in Ireland dip deeper into their pockets. To refer to another point, they were always getting notice of a rise in the price of sulphuric acid; and at the same time the Government kept sulphate of ammonia at a fixed price. They asked them to make as much sulphate as they could, and to supply the farmers at as low a rate as possible, and yet they allowed the acid makers to raise the price of vitriol. The question of salaries the President did not touch upon. A circular might be sent from the Association to gas authorities and companies, drawing their attention to the increased cost of living, and pointing out that the labourers had in different cases received increases of from 25 to 55 p.ct., and that managers of small works should be treated at least as generously. If a man was paid properly, he would give of his best to his company or council; but his employers must look to it that he was adequately rewarded. He often feared that under-payment might be the means of making a man dishonest. A poorly paid man must get his supplies somehow and from somewhere; and if the companies and councils regarded the matter from a proper standpoint, they would pay their men adequately. He had no grievance himself; but he spoke from what he knew of the cases of a good many other men in Ireland.

Mr. W. H. Roberts (Newtownards) seconded the proposition, and added that he thought the proposal which was to come before them regarding the formation of a Commercial Section was a most important matter, which they should seriously consider.

The vote of thanks having been cordially accorded,

The President returned thanks, and said that if the Commercial Section were brought about, he was sure more interest would be taken in the Association. He then asked Mr. Reid to introduce this subject.

A PROPOSED COMMERCIAL SECTION.

Mr. T. J. Reid (Ballina) said that the subject which he had been asked to introduce was, as they had already been informed by the President, the proposed formation of a Commercial Section in connection with the Association. He had himself really come to think that this was the most important proposition which had come forward at any of the meetings since the Association was started. He did not claim to have any special knowledge concerning how such a Commercial Section should be worked, or what it really would be. In fact, he thought it was this want of knowledge on his part which determined his selection by the Committee, following high precedent in such matters, to act as sponsor for the proposal at that meeting. However, be that as it might, he made the confession for two reasons. First of all, that the subject might not be prejudiced by any deficiency in his advocacy of it; and, secondly, that he might preserve a certain line of retreat should he deal with the matter wrongly. To further preserve this position, he might say that the proposal was really the President's. There were certain advantages in approaching a subject of which one had no prior knowledge. One could approach it freely, and without any of the bias or prejudice which a more intimate knowledge would be sure to engender. Approaching the matter, therefore, with a mind free from all prejudice, he was, on considering the question, amazed at its possibilities. He came to think before very long that in the formation of this Commercial Section might be seen the possibility of resuscitating the Association, and putting it on an even higher plane than it had ever reached before.

The Position of the Association.

It must be patent to every one of them that for some time past the Association had not, from some cause or another, taken the place it should as the only Association of its kind which could claim to be national. They had not had the attendances of ordinary members, or the support which they had a right to expect. Now, he thought it was time that they, as an Association, should ask themselves what really were the causes which prevented it from being the important factor which it should be in the progress of the industry. They should try to find out if there was anything in the Association, or any deficiency in it, which prevented its advantages being made use of by the ordinary members more than had been the case. He did not think they could claim the incidence of the war as the cause of this, because signs were not wanting before the war broke out that the Association was slowly declining. Now, in connection with this fact, he might remark that it had often been a matter of wonder to him that more enthusiasm had not been shown by some of the ordinary members in the Association. If one read the list of attendances and studied what was done at the meetings, it would be seen that the changes were rung over a very few members. This was not as it should be. The Association should represent, and should loyally represent, the entire gas industry in Ireland; and every gas manager should feel in coming to the meetings that he was coming to an Association which was really his own, and in the proceedings of which he should take a part, as he would in any other meeting of a similar kind. This had not been the case; and he would like something to be done that might make the Association appeal to every person interested in gas-works in Ireland, and might compel him to join it in his own interest. Further, he had often noticed, and he had wondered why, the larger gas concerns in Ireland did not identify themselves more closely with the Association. He had often tried to understand the psychology of the persons in control of these works, which prevented them taking a part in the proceedings as they should do. He thought their action compared very unfavourably with what occurred across the water, where the managers of the very largest gas-works did not think it out of place to join in discussions in the smallest Associations. Without endeavouring to ascribe reasons for this, he would earnestly appeal to them to join and make the Association what it should be—a really National Association, solely concerned with the furtherance of the welfare of the industry. He did not care what was the size of the works a man might be manager of, he could not afford to comfort himself in a splendid isolation and look down on his smaller brethren. This was a feeling which should not be. There was a certain community of interests which, deny it as one might, could not be got over. The gas industry in Ireland was not merely an aggregation of units—it was one great industry; and what affected one particular gas-works would affect the whole. Even the largest works were affected by what occurred in the smaller places. They could not get over the fact that they were all of them for creating good atmospheres at the present time; and they must create a good atmosphere for gas. Anything which retarded this was inimical to the welfare of each individual works and must react all over the country, and all over the industry, for the matter of that. He had referred to this point particularly, because it was always a matter of wonder to him, as he had said, why the larger works should not be more closely represented in the deliberations of the Association. It surely could not be that those who managed the larger concerns thought it would be beneath their dignity to attend the meetings. He could not believe this was their reason. It would be a stupid and improper attitude to ascribe to them. But a letter had just been handed to him which would seem to show that it might be true. It was from an official of one of the large gas-works; and he would be very sorry, for the sake of the larger concerns, if the reasons given by him for keeping out of the Association should be the same reason which kept others from joining. He did not wish to say anything which would keep them out. They all wanted them in, because, if the bigger men could not learn anything, they could at any rate by their presence allow it to be said that the Association did really represent the whole gas industry in Ireland. The writer of the letter said that, as his name was now before the Institution of Gas Engineers, and as he was a member of many engineering and scientific bodies, he did not wish to join the Irish Association. This did not seem to be a sufficient reason for his refusal. It could not do him any harm to give of his knowledge to his poorer brethren. [Applause.]

The Uses of a Commercial Section.

Now, he had done with this phase of the subject. They might not think it had anything to do with the formation of a Commercial Section; but indirectly it did bear upon it. They did want the Association to really represent the whole industry of Ireland, big or small; and he wished to extend to the managers of the larger works a most cordial invitation to come and help them. They could not keep separate. He had referred to the community of interests which existed in the country; and it was when he considered this question of a Commercial Section more closely that he came to think that in this way, by the formation of a Commercial Section, they might induce those who had not hitherto seen fit to join the Association, or to take any active part in it, to do so. It seemed strange that members of the Association and of the industry, who were at all times ready to put any technical knowledge or skill at the service of a brother, should be so reluctant to give information about the commercial side of their concerns, which might be far more valuable than any technical knowledge. The Commercial Section he had visualized was not like any he had heard or read of; but at any rate he would give his ideas to the meeting for what they were worth. No doubt members with a more practical knowledge of the subject would be able to reduce the building that he proposed to raise to more adequate proportions. Some years ago, there was a question which exercised opinion very greatly in the Association, and that was the question of associated management *versus* individual management. It was rather a vexed question at the time. He wanted to tread very carefully here; for he was not advocating associated management or anything of the sort. When he spoke of "associated management" in this connection, it would be merely be an academical term. There was no doubt whatever there were advantages attaching to associated management which must be apparent to all of them, and so need not be detailed. In the purchase of materials alone—take coal, for example—associated management was a decided advantage; and in the question of freights—which was the most important matter at the present time affecting their interests—it would be a similar advantage. In the distribution of the coal, and even in the supply of skilled labour, associated management clearly had advantages. He claimed that with a Commercial Section, they could attain all the benefits of associated management. There was no earthly reason why they should not undertake the purchase of materials in large quantities; and if they could not attain the advantages he had pointed out as appertaining to associated management, they might at least consider the question. There were, of course, many Commercial Sections in connection with Gas Associations across the water; but the conditions over there were quite different. On the other side, as he understood, they only concerned themselves with the disposal of residual products; but the section he had in mind would go further, and concern itself with everything that might properly be taken into account. Mr. Brook had handed him some information with regard to a Commercial Section with which he had been connected; and he gathered that the various undertakings associated with it were known by numbers, so that their identity could not be discovered. A fort-

nightly return of the prices and stocks of various residual products was sent regularly to the members who subscribed. If any information was required by individual members, the Secretary supplied it. Really, he was not trying to sketch any definite plan of what their own Commercial Section should be. It was his duty simply to recommend the consideration of such a project by the meeting, and then to leave it to the discussion, which he hoped would be full and free, to devolve what he trusted would prove the salvation of the Association, put it in a position it was never in before, and make for the betterment of the industry as a whole and of every member connected with it.

Mr. J. Paterson (Waterford) said that since he got the notice of the meeting, and saw by it that Mr. Reid was to bring forward this suggestion for the formation of a Commercial Section, he had been turning the thing over in his mind; and he could not quite gather what particular form this section was to take. Mr. Reid had, however, somewhat enlightened him. He had thought perhaps it was going to follow the lines of the sections in vogue across the Channel, which had been described as being for the purpose of dealing with the bye-products of the various undertakings. He did not think any of them took part in the purchase of materials or the distribution of them; and while he would not like to say that such a scheme could hardly be made workable, he certainly did assert that it would be a very difficult matter. Where there were a number of companies, and corporations, and committees to deal with, he was sure it would be very laborious, and machinery would have to be introduced to work it which would be so costly that few would join the movement. Mr. Reid had said that the proposal which he had brought forward was one of the most important matters the Association had ever had to consider. To a large extent, this might be true; but, of course, it depended upon the functions that would ultimately be performed by the section. Mr. Reid had touched upon the question of associated management, of which he had now had a little more experience than was the case when the subject was discussed by the Association a few years ago; and he had said that, whether they admitted it or whether they did not, there were advantages connected with associated management that could not be secured otherwise than by the formation of a Commercial Section. If it were admitted that associated management carried with it certain advantages, which could not be disputed, then every single member of the Association representing a gas undertaking would welcome the Commercial Section with open arms. If they were to derive advantages, not only in the purchasing and distribution of all the commodities which they required, but in the disposal of residuals—if it were going to be to the financial betterment of the concerns, no doubt every one would join it. But he could foresee that the Sub-Committee which would in all probability ultimately be formed to lick the section into shape would have their work cut out for them. Of course, it went without saying that no member would commit himself that day either one way or the other. Mr. Reid had referred to the non-attendance of members at the Association meetings. This was a most regrettable fact. There were some members who, like himself, could not attend regularly; but there were others who made no effort to do so. Why did they not attend and graciously lend their assistance at the meetings? There might be some who might not be able to learn much from the members' deliberations; but they could give of their knowledge. If there was any removable cause for their non-attendance, the matter should be looked into. As had been already pointed out, the greatest sinners in this respect were the representatives of the largest concerns in the country; and this made it doubly regrettable. He could quite conceive that managers of small places, for instance, in the South of Ireland, whose remuneration—particularly under present-day conditions with the high cost of living—was not large, might not be able to afford the cost of a long railway journey and hotel expenses; and he thought it was mentioned at one of the recent meetings that if representations were made to the small companies and municipalities or councils who were proprietors of gas-works, and they were asked to pay the expenses of their managers to attend these meetings, they might see that in all probability they would be the gainers in the long run by doing so. He threw out this suggestion to the Committee, as he was afraid that, without some such recommendation, they would be merely beating the air. He was quite in sympathy with the proposal to form a Commercial Section. They were not going to commit themselves one way or the other that day; but the proposal to consider the matter was worthy of support by all. If it were thought workable, probably Mr. Reid would later on propose that a small Sub-Committee should be formed to frame a report. If such a section were formed, all who joined it would have to act straightly and honourably; otherwise the thing would be useless.

Further Views.

Mr. W. H. Roberts (Newtownards) remarked that it was a matter in which he took a great interest, but about which he knew nothing. He did, however, feel satisfied that a Commercial Section formed in connection with the Association must prove a decided advantage. He would give it his whole-hearted support; and he was sure other members would give any assistance that might be required.

Mr. T. Frizelle (Holywood) also expressed sympathy with the idea of forming a Commercial Section. It was about time something like this was done for Ireland; but it could not be started without money. Money was the foundation of it; and where was it to come from? Was it the gas managers who were to support it, or their employers? They should, he thought, begin by considering this point. The advantages were all for their employers; and all the meetings and everything since the Association was started thirty years ago had been for the benefit of the community in which they lived. The ratepayers of every town and district had been benefited by the meetings which had been held. As any Commercial Section would be for the benefit of the employers, they should be asked if they would subscribe towards any expenses that might be incurred in its formation. There was a combination in connection with a number of works in the South and West of Ireland through which he believed the material for the works was purchased; and Mr. Reid could no doubt have enlightened them as to its advantages.

Mr. H. W. Saville (Drogheda) thought the Committee were to be congratulated both on having raised this question and on having induced Mr. Reid to introduce it, The suggestion must appeal to them; but there were many difficulties in the way—particularly in the South. For instance, Mr. Airth and himself practically divided a county between them; and then some were paying double the freight others were. How could a Commercial Section attack this? At present they were practically in the hands of the Government and the Shipping Controller. No doubt some of them had made attempts to get something done through the Shipping Controller, and had had the same experience that he had—that the results were absolutely *nil*. They were simply left to work out their own salvation in the best manner they could. He did not see what a Commercial Section could do for them in a case like this. As to residuals, they could at the present time get any price they liked to ask for coke; and the chief trouble in pre-war times was the dumping of coke from across the water. One point which he had not heard raised was with regard to the price of sulphate of ammonia. They paid—taking it roughly—double as much for coal as was paid across the water; and yet they were fixed to the same price for sulphate as works with half the charge for coal. The latter works sent sulphate over to Ireland, and were subsidized to the extent of the carriage across; and the Irish works had to sell at the same price as they did. This, he thought, was very unfair; and they ought to be subsidized to the same extent as the English works, or at least to the extent of the difference in the cost of coal. Another difficulty in connection with purchasing in quantities was that many of them worked for corporations or councils; and they were bound to ask for tenders under the Public Bodies Order. He did not see, unless they were going to get this rule amended, how they could get a local authority to join a combined purchasing body. Any way, no doubt, they must approach their committees or directors before making any attempt to form a Commercial Section. To try and do it without their approval, or even without their support, would damn the whole thing from the beginning. While he did not say that there was any money required in the first instance, he did not regard this as the best moment to start the idea. It was a wonder they had not done it years ago in the North of Ireland; but he did not see, if it was applied to the whole of the country, what help it would be to them under present conditions. As to the attendance at the meetings, it was hard lines on those connected with the smaller works that the officials of the larger concerns should not take part in the proceedings.

Mr. W. Millar (Cookstown) said the idea of this Commercial Section proposal was that it would enable them to buy in the cheapest market and sell in the dearest. No doubt, if the members were kept properly posted up, they could get better prices for their residuals; and, as to buying coal, it was probable that if they let each other know a little more than they did, good might result to them. While hoping that something would be done in regard to forming this section, he did not think they would get much money out of the proprietors of gas undertakings. If, however, a circular was sent out, it might open their eyes.

Mr. R. G. Taylor (Malahide) said he desired to support the proposal for the formation of a Commercial Section. For one thing, if they could buy coal in large quantities, it would mean much to many of them in small works.

The President remarked that, in regard to his proposal for a Commercial Section, Mr. Reid had gone further than he had anticipated he would do. The suggestions he had placed before them were certainly deserving of consideration. In his own experience on the other side of the Channel, they never got any further than circularizing information with regard to the increased cost of coal from one year to another. Each member undertook that he would not sell in any other member's district coke or sulphate of ammonia at a less price than was being charged in the district. The section would have to start in a very small way, and then be developed as was found practicable. The section he had been connected with did very good work; and if loyalty could be depended upon among the members, there was no reason to fear starting the scheme there. The Council he was with paid the subscription, which was quite a nominal sum—10s. a year. Any manager connected with a council could get it through, if the committee consented to pay it, by having the receipt written out in a special form to meet the requirements of the Local Government Board Auditor. Already this Council subscribed to the Sulphate of Ammonia Association, and the Auditors saw it and passed it, because it was for information which was necessary to the successful carrying-on of the undertaking. There was no difficulty about that. For circularizing information, every works had a number, and the information was sent on post-cards; so that if a post-card fell into the hands of someone interested in the sales, he would have no knowledge of what it referred to. A key was supplied, which was kept by the members of the section. If any difficulty should be found in the working, he did not see why there should not be four sections for the North, South, East, and West of Ireland. He hoped the proposal would be given a trial; and if there was any trouble in getting councils or companies to pay the cost of sending out the information, or even of attending the meetings, steps might be taken to show them that the scheme would benefit their undertaking.

Mr. Reid's Reply.

Mr. Reid remarked that he had very little to reply to. He was rather disappointed that more of the members had not joined in the discussion. What had been said seemed, on the whole, to be favourable to the scheme. Some speakers had raised the very difficulties which the section would be designed to overcome. It was with the very idea of getting over these difficulties that the section would be formed. It would not be possible to attain right away to the Commercial Section he had visualized. Turning for a moment to the question of coal. What he himself did was to get a steamer of 300 or 400 tons into Dublin. He had to get it this way now; but it was a congested port, and labour troubles were acute—steamers being in consequence held up. Then there was difficulty in providing wagons, because the coal would all have to go into one railway company's wagons. Suppose, however, that a steamer arrived, and he could dump his coal into as many railway companies' wagons as he pleased, this would expedite the unloading of the steamer, and enable them to supply coal in the smaller quantities which would suit the undertakings having a small

amount of capital in hand. Everybody, it seemed, would like to see the section started; but they feared there were obstacles to be faced. It was not his intention to point out a royal road to overcome them; but he did not think their surmounting was beyond the powers of members of the Association. In connection with what he had been saying, he would like to refer to the work of the British Commercial Gas Association. Looking over the list of subscribers to this organization, he was sorry to see how very few Irish concerns were represented. It was, however, an Association which ought to appeal more particularly to the small undertakings than to the larger ones, because the subscription was based upon the amount of gas produced; and therefore the smaller concerns got all the benefits which the Association could give at a very trifling cost. He could not speak too highly of the work of the British Commercial Gas Association. The publications issued by the Association were alone worth the amount of the subscription the smaller undertakings were called upon to pay. They were excellent productions; and if members were in any difficulty, the Secretary was always willing to oblige. Every member of their Association should get the concern with which he was connected to subscribe its quota. The question had been asked, "Where is the money to come from?" It was not the intention that the Association should find the money; it was the concerns with which they were connected that should do this. It was a remarkable fact that the Association, though it had met for thirty years as the Irish Association of Gas Managers, had never done anything to further the individual interests of their gas managers. Something definite, he hoped, might take shape out of what he had said and the criticism that had been offered. He would suggest that a Committee be formed to look into the matter, and see if a Commercial Section could be started which would be beneficial to the members of the Association and to the works with which they were connected, and thereby to the gas industry generally.

Election of District Representative.

The President proposed, and it was agreed, that Mr. H. Kirkham, of New Ross, the incoming President, should be the District Representative on the Council of the Institution of Gas Engineers for the coming year.

Next Meeting Place.

The President announced that the next meeting of the Association would be held in Dublin.

Luncheon.

The proceedings were then adjourned for luncheon at Ye Olde Castle Restaurant, at which the members and friends were the guests of the President.

Intermittent Vertical Retorts for Medium-Sized and Small Gas-Works.

On re-assembling in the afternoon, Mr. J. G. Ambler, of Messrs. Goodall, Clayton, & Co., Ltd., of Leeds, read the paper on "Intermittent Vertical Retorts for Medium-Sized and Small Gas-Works" which was published in last week's "Journal," p. 276 9.

The President said he was sure they were all very much obliged to Mr. Ambler for the trouble he had taken to come and read his paper. He (the speaker) had the pleasure, when he was visiting England a few months ago, of going to his native town of Ossett to inspect their installation of vertical retorts. He was agreeably surprised with the easy way in which all the coal was handled, and also with this system of discharging. Practically all the heavy work was done away with. He was specially interested in the arrangement for the sealing of the hydraulic main. A matter which concerned them was whether or not for small gas-works there was any advantage, taking into account the cost of these installations. He had looked at the matter in a good many ways, and some years ago considered, in connection with the Lisburn Gas-Works, whether or not verticals would be the best thing to put in. Really, he had yet to be convinced that vertical retorts were the thing for very small gas-works. They were, however, certainly doing wonders, and were likely to progress still further, because, of course, they were still in their infancy. In fact, vertical retorts were very useful if one had a works with the necessary output of gas.

Mr. W. Millar (Cookstown) asked whether there was any installation round about like the one referred to, which the manager of a small works could see in operation. Supposing the elevating machinery were eliminated, how would the cost of the system compare with an installation in the old style? Some people said the coke was smaller than with horizontals; and he would like to know what was the difference in the quality of the coke made by these intermittent verticals, as compared with the continuous type. Would it be possible to make the system pay in a 10 million c.ft. works?

Mr. T. J. Reid (Ballina) inquired how the cost of production compared with that of the system described a year ago by Mr. Enright, of Tralee. He referred to the methane-hydrogen plant. If the advantages claimed to be obtained with the plant described last year could be maintained in practice, he did not think, either from the point of view of initial cost of erection or of working results themselves, that any system of retorts, vertical or otherwise, could compete with it.

Mr. J. Paterson (Waterford) remarked that most of them already had a carbonizing system in a good state of preservation or otherwise. If one's retorts were worn out, and it was a question of putting in new ones, then they could consider whether it was more advantageous to adopt horizontals or verticals. In such a case, verticals might be found better; but where there were already horizontals in a fairly good condition, and doing their work well, small works could hardly consider the question of going to the expense of putting in an installation of verticals, whether intermittent or continuous. He could quite appreciate that, for small works, speaking generally, the intermittent system was the more suitable. The author, however, said the system was "positive and definite," which was a big claim to make. It lent itself to the steaming arrangement; and the results given by the steaming were exceedingly good, both as regards make and quality of gas. The yield of coke for sale, too, was quite excellent. In fact, if all that was claimed in the paper was realized in actual practice, as appeared to be proved by the tables at the end, he would predict for it a long and well-deserved spell of prosperity. The author referred to the fact that some settings built of the same fire-clay maker's material, and working under the same conditions, were worked-out considerably quicker than others. Perhaps some of them knew why this was. There was another factor besides the quality of the material used, and that was the workmanship put into it. One great objection to these vertical settings applied very forcibly in his own case, and that was the extra strong foundations required. The settings covered a comparatively small area, and had to carry an enormous weight of material; and where the works were situated on boggy ground, it was very difficult to get a good foundation. At Waterford, the works were practically on a bog, and the ground had to be carefully piled; and it was a question whether they could get any foundations strong enough to carry the enormous weight of these settings.

Mr. T. Frizelle (Holywood) asked what size of works was the smallest Mr. Ambler would recommend for this system of vertical retorts.

Mr. Ambler: Fifteen million cubic feet per annum.

Mr. Frizelle (continuing) remarked that these retorts held a good quantity of coal; and in a small works with an output of 15 million cubic feet per annum, the make per day would not be very considerable. It was stated that these vertical retorts took a full charge of 9 cwt. With horizontal retorts they knew the latter part of the charge was not of the same illuminating power as the first. With these verticals taking 9 cwt., there would be a large amount of this tail-end of the charge at one time; and unless there was spare holder room—and where was there a small gas-works with two or three holders?—this poor gas would be getting out into the mains, and there would be an outcry. His own opinion was that the continuous vertical was the system for a works making down to 30 million cubic feet—not less. The coal went in continuously, and the gas was made in a constant stream. The result was that the gas was mixed up all together, and there was not the difference in quality to which he had referred. It was possible to get a very good make of gas. He must say that he put very little faith in statistics prepared for the purpose of being printed. He would prefer to go to a works where the retorts had been put up, and make inquiries for himself.

Mr. Ambler, in reply, said, as to lifting and elevating machinery, for a very small installation it certainly would not pay to put in an elevator and the necessary machinery. There could be substituted an ordinary hoist with a gas-engine, which was far less expensive. The coke from intermittent verticals was harder and denser than from horizontals; and it could be screened to sizes to suit almost any purpose. It had been said that it was more economical than coke from horizontal or inclined retorts. The nearest installation to Belfast was at Banbridge. Working costs, of course, varied according to wages; but the information he had on this point was of a somewhat private nature. Mr. Nelson, the President-elect of the North of England Association of Gas Managers, would, however, he believed, be dealing with the subject. As to the use of the expression "positive," a known weight of coal was placed in the retort and carbonized. This was what he called a positive method of carbonization. The "definite" working was simply the regular discharging and charging of the retorts. All work in connection with the system was definite and regular. When speaking of refractory materials, he was assuming that the workmanship was in all cases equal. Something must be done to keep the clay up to standard. In connection with what had been said about the result in a small works of placing 9 cwt. of coal in a retort at a time, it must be remembered that it was not the practice to charge all the retorts at once. They were split up. In the case of four retorts, they would charge two at a time; and to add to the flexibility, there was the steam which could be cut off.

Mr. Paterson pointed out that a question had been put by Mr. Millar as to the comparative cost of an installation on this system and horizontals. He did not know whether the author was prepared to give this offhand.

Mr. Ambler said that, without quoting any figures, the first charge would be higher in the case of all verticals.

Difficulties Experienced at Mallow.

Mr. P. J. Philpott then read a paper entitled "Exceptional Difficulties Experienced in the Administration of the Mallow Gas Undertaking." This, with a report of the discussion that took place, will be found on pp. 332-3.

The Secretary and Treasurer.

The President said they were now coming to the close of the meeting; and he wished to propose a hearty vote of thanks to their Hon. Secretary and Treasurer. Mr. Airth had been a very strong friend of the Irish Association. They had all sympathized with him in the unfortunate accident by which he had sustained a broken arm.

Mr. H. W. Saville (Drogheda) seconded, and remarked that their Secretary had done much to keep the Association together.

The vote was cordially passed, and acknowledged by Mr. Airth.

At the Belfast Gas-Works.

The short time that remained between the closing of the meeting and the hour fixed for the dinner was made good use of by a party of members taking advantage of the permission accorded to visit the Corporation Gas-Works in Ormeau Road. On arrival, they were met by Mr. J. D. Smith (the Engineer and Manager), who showed them the working arrangements of the Glover-West continuous vertical retorts. All the coal gas at Belfast is being made in these vertical retorts, of which there are two houses. The house first erected contains 80 retorts, and the one inspected by the members 160; and after five years' working, it has only just been necessary to start renewing the original retorts. The larger house has a capacity of 5⅓ million c.ft. of gas per day. Coal can be

elevated at the rate of 50 tons per hour, and passed into hoppers running along over the retorts of sufficient size to hold 48 hours' supply. Not a shovel touches the coal from the time it leaves the barge until it becomes coke. Much interest was also taken in a telpher plant which has been put up by Messrs. R. Dempster and Sons for the purpose of dealing with the coke. By means of this, coke can be taken in skips from the large hopper into which it is passed by a conveyor from the retort-house and deposited in the yard or on to either of two jigging screens which separate the large from the small. The large coke is allowed to fall straight away into bags, just as it comes from the retorts, and is sent out to customers, or it can be run from screens into railway wagons. Everything is electrically equipped; the current being generated by three sets of twin gas-engines which are started by means of compressed air. The arrangement is for each set to be one day working and two days off. There is exhausting plant equal to dealing with 10 million c.ft. of gas per day, and carburetted water-gas plant—six sets of Humphreys and Glasgow's make—of a capacity of 5 million c.ft. a day. The two houses of original hand-stoked coal-gas settings which remain are, as already remarked, not now used, except in cases of emergency. There is promise in due course of further extensions—in the fact that the Corporation have acquired an additional 4 acres of land on one side of their chemical works and 2 acres on the other.

The features noted here were pointed out to them; and the members were then obliged to take leave of Mr. Smith, in order that the remainder of the programme might be adhered to.

The Annual Dinner.

In the evening, a large party of members and friends met again in Ye Olde Castle Restaurant, where dinner, with music and song, and a little speech-making, brought a successful day's programme to a close. After "The King," Mr. A. M'Nally (the Chairman of the Lisburn Urban District Council) proposed the toast of "Prosperity to the Irish Association of Gas Managers," coupled with the name of the President, who responded, and then submitted "The Hon. Secretary and Treasurer," which was replied to by Mr. Airth. The toast of "The Ladies" having been proposed by Mr. S. Freeman Burrows, the President was heartily thanked, on the proposition of Mr. J. Paterson, of Waterford, for the excellent musical programme he had provided.

The Excursion.

As usual, in connection with these meetings, Mr. Airth had mapped-out a tempting programme for a day's outing on Wednesday; and he was rewarded by finding a large party assembled at the railway station at the time of departure of the train for Newcastle, co. Down. Saloon carriages had been reserved; and in these a pleasant journey was made, through some beautiful scenery, to the typical little Irish seaside resort which the Secretary had made the objective of the excursion. Dinner and tea were well served in the large Slieve Donard Hotel which has been erected to meet the needs of visitors by the Belfast and County Down Railway Company; and the remainder of the time passed all too quickly amid the attractions of sea and mountain.

The Bangor Gas-Works.

Several of the members who had been able to remain in Belfast overnight were afforded an opportunity on Thursday of inspecting the gas-works at Bangor, which is a flourishing seaside place near the city. Bangor has of recent years—no doubt owing in part at all events to the progressive policy of the railway authorities—been going ahead at a very rapid rate; and to the visitors last week there was proof that to-day it stands high in popular favour. With the town, of course, the gas-works have also gone ahead. In fact, instead of having to look for business, the gas undertaking has, as it were, been taken along by the town. For instance, when Mr. B. Mitchell, the Engineer and Manager, was appointed some sixteen years ago, the make of gas was about 10 million c.ft. a year; whereas now it has reached 60 millions. Such expansion in output as this has naturally called for additional manufacturing facilities; and, indeed, since Mr. Mitchell has been there the works have been modernized throughout. They are now excellently arranged in every respect, and have a well-kept appearance. As in Belfast, the carbonizing plant in use is an installation of Glover-West continuous verticals, of which there are two beds of sixes. The vertical system proved particularly suitable for Bangor, from considerations of ground space. Since the retorts were installed three years ago, they have never given the slightest trouble; and the question of renewal has not even been thought of. The coal elevating and coke extracting plant is gas-engine driven. The two exhausters are steam-driven; and there is on the works a sulphate plant equal to making 1 ton per day. At present there is storage for coal (which is all sea-borne) to the extent of about 1100 tons; and a scheme for extending this will probably be taken in hand later on. The storage requirements are met by a two lift spiral-guided gasholder, by Messrs. C. & W. Walker, of 230,000 c.ft. capacity, and a smaller one to contain 60,000 c.ft.

An interesting point was drawn attention to in connection with the purifiers. Some time ago, while diverting a watercourse, Mr. Mitchell found himself with more cement than he actually required; and as he was just then contemplating erecting two new purifiers, he determined to make them of concrete. He did so; and they have proved most satisfactory. He would do the same thing over again; and, in fact, everything is arranged to put in another two. The scarcity of rubber led him to try the experiment of using for luting Manilla rope, with a "worm," boiled in tallow, and simply secured underneath the lid by thin copper wire to keep it in position. After the first screw-down, it adheres to the lid without any fastening at all; and it has proved to fulfil admirably the purpose for which it was intended.

EXCEPTIONAL DIFFICULTIES IN THE ADMINISTRATION OF THE MALLOW GAS UNDERTAKING.

By P. J. Philpott, of Mallow.

[A Paper read before the Irish Association of Gas Managers. Aug. 14.]

In the year 1910, the Mallow gas undertaking passed into the hands of its present owners, the Urban District Council of Mallow, by compulsory purchase. At that time few imagined the present condition of affairs; and it is safe to assume that those responsible for the framing of Special Acts of Parliament as applied to gas undertakings were not in the know. I make these opening observations because experience has taught me that in many cases the Acts were hastily conceived, and thus imposed much extra work and responsibility on managers' shoulders, without, in many cases, achieving the desired results. It was, however, up to all of us to shoulder these burdens cheerfully and to do what could be done in the interest of the State. And so we go on to the difficulties.

War Time Coal Supplies.

Coal, the prime factor in gas-works, has been responsible in my small undertaking for an increased expenditure of £600 per annum. There was no source to tap directly to counterbalance this effect. Repayments of loans contracted by the Council on behalf of the undertaking could have been easily met by the profits of the year's working, provided we had been working in normal times. Having, however, to meet an advance of 100 p.ct. on coal, our only way out was the levying of a gas-rate on the town. Fortunately, we enjoy the privilege of being an urban authority, and in the way mentioned can recover the loss that we sustained.

When our last advertisement appeared inviting tenders for the year's supply of coal we had only one response, and then f.o.b. had to be accepted, taking our chance of securing freightage. This was a source of worry, which had not to be faced heretofore, as the coal had previously been delivered to the works. Furthermore, there is now the added penalty of demurrage charges on unloading boats, and on delivery trucks, which are very often necessarily held up owing to the priority given, and rightly so, to Government shipping, which we are well aware has assumed huge proportions. I have been informed of such a case of hardship as the consignee having to pay as much as £80 demurrage claimed on a consignment of coal to a southern port, partly due to the cause mentioned.

Charter-parties of the present day schedule the boat's time for loading and unloading in what is called "running" hours. Previously this was done in working hours. The result is that if a boat of (say) 300 tons arrives at a port of discharge late on Christmas Eve, her time for clearance of cargo expires twenty-four hours later—and this is at a time when men are rather reluctant to embark on a new job. When one considers that freightage alone on this particular boat amounted to close on £250, as against a pre-war figure of £75, some idea may be gained of a manager's responsibilities under this heading alone.

Assuming that the vessel is successfully cleared, and demurrage charges avoided, the next difficulty experienced is the securing of sufficient railway trucks, the scarcity of which for ordinary purposes is aggravated by the shortage of manual labour and traction power, both having been commandeered to a very great extent for Government use. These difficulties had to be overcome by the institution of careful and efficient administration, built up on existing conditions.

Leakages and Public Lighting Arrangements.

For instance, leakage of mains, &c., had to be reduced to a minimum. Public lighting, leaky services, and inaccurate registration of meters came under this heading. In regard to public lighting, the system, as arrangements stood, was to my mind more or less lax, reminding one of a purchaser measuring out his own quantity and, of course, giving himself the benefit of the doubt with a good drop of the scales. In order to satisfy myself on this point, I went round the district on several mornings and noted the hour at which the lamps were still alight and at which they should have been extinguished. Finally, I had to adopt the system of a lamplighter's record book kept on the works, recording the times of lighting and extinguishing. By this means any extra lighting would be charged to the owners. Even with the owners paying for public lighting, to my mind no practical method can be carried out with other than gas-works employees as lamplighters.

Dealing with Consumers' Complaints.

On taking over the works, I had several complaints read to me as to the insufficiency of supply. I had not the services of a

really competent fitter—as a matter of fact, no one who, on receipt of such a complaint, would go further than to clean a burner or clear the nipple of a cooker to seek the cause of complaint. Such a thing as a kit-bag pressure gauge was new to a fitter in these parts. I therefore found it incumbent on myself to visit every consumer who had lodged a complaint for the second time, and succeeded in tracing the fault in the majority of cases to the service. As a result, I had fifty services relaid in six months.

A very singular thing about this matter was that, although the majority of the services were in a crumbled condition, no complaints of actual leakage were notified. The condition of these services was attributable to their having been laid too shallow, due to the main not being of sufficient depth to allow enough protection to the services. The only preventative other than lowering the main—which was out of the question—was to slieve the service with a piece of cast-iron main, filling in with pitch and tar. This was accordingly done, and had a most noticeable effect on the following quarter's accounts. No further complaints reached me on this account.

Inaccurate Registration of Meters.

Having put the services in order, my next item of investigation was to make sure of accurate measurement. One can more readily arrive at conclusions regarding the accuracy of the ordinary meter than of the slot meter. I have found cases of slot meters where gas had been consumed without being registered. The consumer, in order to keep possession of the most profitable article, passed a shilling or two through the slot prior to the collection. In our case it is extremely hard to follow the rule of removing through too small collections. During the year under discussion, close on thirty meters were removed for this and other reasons.

While on this point, it may be of interest to cite a cause of an exceptionally high jump in a quarter's consumption through an ordinary meter without any apparent reason. On investigating the cause, I found that in a disused part of a workshop adjoining the premises the flexible tube of a pendant had become so rusted that its own weight caused it to tear, and so sent the consumption up. The main cock never being turned off, the gas had escaped night and day unnoticed by the consumer. I have during my time never fixed pendants so arranged, as I have found them to be the cause of many complaints.

Combating a Labour Difficulty.

In small municipal undertakings it often falls to the lot of the manager to tackle the retort-house work. I have not escaped the ordeal. I refer to this, as I consider it is a long standing grievance, which is not always due to the other employees; the blame being very often attributable to encouragement on the part of urban representatives. I got my Council to pass certain resolutions, a copy of which was sent to the employees notifying them that the Council would not interfere with the Manager's decision. This had a salutary effect; and henceforth I did not experience the disappointment of finding the retort-house wholly unattended and the test light failing. Before that it was no strange matter to find that the stokers had shirked their jobs, leaving the Manager to go on with the work.

Experience of a Flood.

On Nov. 17 last, I was awakened at 5 a.m. by hearing shouting in the vicinity of the works. I slipped on my clothes, and went to investigate the cause of the alarm. I had not long to wait, as I found myself ankle deep in water outside my own door. I soon became aware that the flood was rapidly rising. By 11 a.m. the water had reached the furnace. Luckily I had a good stock in the holders, without which it would have been a case of "lights out." In spite of all difficulties, the engine was kept going until 11 a.m., when it became necessary to stop further work. Having made provision for the escape of steam from our setting to minimize contraction, I evacuated my position and got through the bedroom window to my house. I ascertained that damage of an extensive nature threatened a local flour merchant's premises, where a large quantity of grain was stored on the ground floor. In this establishment a producer gas plant is kept to work the main engine; our gas supplying an engine used for generating electric power. Had it not been for this engine coming to the rescue, very valuable material would have been destroyed. The producer plant was entirely thrown out of action.

The flood which caused the extinguishing of our fire, with the consequent cooling of the setting, was at its highest at noon on Friday, and did not recede sufficiently to restart until Saturday at 3 a.m. I, however, kept the town going without cessation of supply, and recommenced operations at 6 p.m. on Sunday with poor heats and six rivets of stock, having successfully pulled through what promised at first to be a case of "lights out." I retired to rest at midnight on Sunday, having undergone forty-eight hours' continuous work.

DISCUSSION.

The President (Mr. A. S. Brook, of Lisburn) said they could all sympathize with Mr. Philpott in the strenuous times he had gone through. He (the President) had seen the Mallow Gas-Works since the Council took them over; and he was sure the author had had a great deal of trouble in getting things shipshape.

Mr. H. W. Saville (Drogheda) said it was to be hoped that the experiences related by Mr. Philpott were altogether a thing of the past. When they heard a paper like this, it made them think it was a pity there was no Kipling in the gas profession to put into his phraseology the experiences of a gas manager. It was, of course, by such experiences as had been related that many of them learned what they knew. A manager should be ready to tackle such difficulties when they arose. Mr. Philpott would certainly feel that he was a much better gas manager as the result of what he had gone through. Those managers in many parts of England who only had to call in the next-door neighbour when in a difficulty did not know what gas management meant in Ireland.

Mr. J. Paterson (Waterford) said the experiences Mr. Philpott had related had been the experiences of most of them at some time or another. Great credit was due to him for the way in which he had acted. The Mallow gas undertaking was another example of compulsory purchase which turned out rather unfortunately, like several they had heard of before. What with legal, arbitration, and other expenses, the Council had paid pretty heavily by the time they got the concern, though it might have been a good paying thing before they took it over. He was very sorry to learn from the paper that, owing to certain specified difficulties, the principal of which was a 100 p.ct. increase or more in the cost of coal delivered at Mallow, they had had, in order to make ends meet, to resort to the striking of a rate-in-aid. It was a pity to do this. Could they not have increased the price of gas, or did their Act or Order restrict them in this respect? He did not care for the principle of levying a rate on every ratepayer to relieve the consumer in the matter of the price he should legitimately pay for his gas. The consumer was practically in the same position as some gas undertakings which strongly objected to subsidizing the electric light and tramways out of their profits. Of course, he knew what was done was not in any case Mr. Philpott's fault; but the fact remained that there was a rate-in-aid struck to enable the gas undertaking to pay its way. One remark the author made was with reference to the shallowness of service-pipes, and the corrosion in consequence of their proximity to the surface, and the fact that they were so near the surface because the mains would not permit of them being laid any deeper. He himself had had charge of a works where the mains were laid originally 21 in. deep—that was, with only 21 in. covering. It was a rocky subsoil; and he was surprised one day to find the top of the main actually showing above the road. On making investigations, he found this road had not been metalled for a considerable number of years; and the surface had worn-down about 1½ ft. If the Mallow Council were in such an awkward predicament that they had to strike a rate-in-aid, the probability was that they had starved their roads, and left the mains to come to the top.

Mr. W. H. Roberts (Newtownards) said it seemed to him that the Mallow Council were quite correct in striking a rate-in-aid. When the Council took over the works, no doubt the parties responsible were gas consumers; but now many of these persons, with the high price of gas, would probably have ceased to consume it—leaving to the remaining consumers the responsibility of meeting the big deficit. He had recently had a little experience for the first time of a very small gas-works; and he could say that managers of such places had his sympathy. Managers of small gas undertakings who were overcoming such difficulties deserved every credit for it.

Mr. S. Moore (Portrush) recalled a case in which there was supposed to be a great deal of leakage; but the manager, on investigation, found that the station meter was 5 p ct. fast.

Mr. Philpott, in reply, said they had had to strike a rate-in-aid for the simple reason that they were limited in the price which they could charge for gas. Thus the course taken was the only means of recovering the loss sustained. He could not settle the point raised about the depth of the main, because there was no chart which would have shown him the original depth. He was informed that in the Company's time an attempt was made to lower the mains. The increase in the gas-rate, he believed, was not anything like the increase in the price of coal. The maximum price of gas was 5s. 9d. per 1000 c.ft.

Gas-Fired Boilers for the Repair of Automobile Tyres.

Writing to the "Rochester Gas and Electric News" [New York], Mr. Leo. J. Sullivan enlarges on the necessity of a regular supply of steam at even pressure, in the "curing" of automobile tyres under repair. By using a thermostatic device set at the requisite pressure—about 60 lbs.—risk of either under or over-curing is avoided; also unnecessary consumption of fuel. He describes the satisfactory replacement of a coal-fired boiler by a gas appliance, set in a pit to admit of the return of condensed water, at the works of the Union Vulcanizing Company, Rochester, N.Y., which gets up steam in 20 minutes, as compared with 1½ hours, avoids dust and ashes, which previously gave much trouble by settlement on the fresh cement, saves labour for watching and maintaining steam pressure, occupies only one-quarter the space, and increases both the quality and the quantity of the work done.

Calorific Power Orders.—The two latest Provisional Orders to be issued by the Local Government Board under this Act relate to the gas undertakings of the Borough of Blackpool and the Urban District Council of Bingley, Yorks.

The Illuminating Engineering Society of America announce that they are already in a position to circulate among the members (for the purpose of written discussion) four of the long list of papers already arranged for the Autumn Congress that has been abandoned in consequence of the war. There will be the President's Address and the following papers: "Report of the Committee on Nomenclature and Standards," by A. E. Kennelly, Chairman, and C. H. Sharp, Secretary; "Illuminating Engineering Publicity," by G. H. Stickney; "Economics of Large Building Lighting," by C. L. Law and J. E. Buckle; "Illumination Intensities in Large New York Department Stores," by W. F. Little and J. F. Dick. Other papers of this "Correspondence Convention" will be ready during October, November, and December.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Coal Controls.

Sir,—Will you kindly permit me to occupy a little space to air a grievance which is not peculiar to myself, though happily there can be few who are sufferers from a similar cause, to the same extent.

My trouble is with the Coal Controller, and is in relation to the Aberystwyth Gas Company, of which I am Chairman. This Company is in possession of two contracts for coal supplies from Ruabon, under which we thought ourselves provided for a period of about twelve months from the present date. The railway rates on these supplies are 5s. and 5s. 3d. per ton. The Coal Controller, whose province it is to reduce transport, proposes to despoil us these contracts, and to compel us to resort to South Wales for future supplies. It is practically admitted that the coal procurable from this field is very inferior, and that the transfer would involve extra haulage of about 300,000 ton-miles per annum. But this contention is met by the rejoinder that, by the transferring of our coal to North Wales, an even greater length of haulage will be saved; for deficient supplies there would have to be made good from Yorkshire. Now the extra freight from the latter area is not more than 4s. per ton, which, upon our weight of 4200 tons, amounts to £840. This is the extreme cost of sending into North Wales a quantity of coal equal to the requirements of my Company. What is to be the cost to Aberystwyth? At the lowest estimate, an increased price of 8d. per 1000 c.ft. on gas (£1600) and reduced dividends of £200—together, £1830 a year, to save £840!

To this the Coal Controller replies that it is not a question of money, but of transport. Against this, I contend that, to the poor people of Aberystwyth, it is very much a question of money, and that if the Government are so unconcerned about money considerations, why should they not take us over as a controlled concern? The mischief would not end there, however, for the inferior South Wales coal would necessitate the use of 25 p.ct. more; and this would create a proportionate demand for retorts and men. How are either to be obtained? I say it will be impracticable to obtain either! The Ministry of Munitions are making an earnest appeal for more tar; and this request must result in an increased employment of 10 p.ct. more men, and more retorts, estimated upon the total gas manufacture of the whole country.

How, then, is an out-of-the-way community, largely composed of women lodging-house keepers, to face the new conditions? Even now the management is kept in a state of perpetual unrest lest a single employee, in any department, should fall-out from any cause for a day or two! Further, on the subject of munitions, I am proud to say that, months ago, my Company, at considerable expense for so small an undertaking, laid down a plant for oil-washing and debenzolizing, which is in operation with satisfactory results. But this plant may as well be scrapped for all the use that we can make of it under the proposed new conditions. And, again, supposing that we could find men, and use the extra coal, the yield of tar from all that 25 or 30 p.ct. more would be inferior to our present production, which is at the rate of 14 gallons per ton, as against 10 gallons, the product of South Wales coal.

The coal-control scheme is excellent in its inception, and will result in improved and economical working; but if it is not tempered with a little elasticity, it may break with disastrous consequences to outlying communities.

Henry Woodall.

7, *South Parade, Llandudno,*
Aug. 17, 1917.

Re-issue of Debentures.—A Query.

Sir,—We have some terminable debentures falling due, and propose to renew them. There is some difference of opinion among the Directors—some saying that the old scrip must be cancelled and new issued in place, and others that the existing scrip can be endorsed as extended in time, and that new scrip would involve application for permission, as is necessary for new capital.

Could some of your readers kindly indicate the usual practice and also say if renewals are regarded as the same thing as *bonâ fide* additional capital?

Perplexed Secretary.

Aug. 13, 1917.

Mr. Curphey and Tar Dehydration Plants.

Sir,—In his report to the Local Government Board, the Chief Alkali Inspector questions, from a national standpoint, the advantage of gas-works dehydrating their own tar. Mr. Curphey bases his disapproval of this practice on—

(i.) Lack of skilled supervision.
(ii.) The working of faulty plants.

I hope Mr. Curphey's conclusions will not be taken too seriously by those managers who contemplate dehydrating their own tar, as apart altogether from the better financial return, there can be no doubt tar dehydration at gas-works is of great advantage to the community.

It is well known that crude tar may not be used on roads; so that the gas manager who has no dehydrating plant is bound to sell his tar to a distiller. The distiller then removes the water and light oils, and resells it for tarring roads which may be, and often are, in the same district as the gas-works which supplied the crude tar. The resulting waste of transport and labour need not be enlarged upon. It may also be pointed out that gas-works are good centres of distribution for road tar, whereas tar-works are usually found grouped together in limited areas.

The process of tar dehydration is one which is comparatively new to gas-works, and, under present conditions, skilled labour cannot well be obtained. But it is only fair to expect that "practice will make perfect," and that supervision will become more efficient with greater experience.

With reference to faulty plants, Mr. Curphey and his assistants render the greatest service to the worried gas manager by helping with their expert advice. But the blame should be laid on the manufacturers of these plants, who turn out a stereotyped apparatus to deal with tars which often differ widely from one another. At the same time, the difficulties which have arisen from the use of these plants have had a most valuable educating effect on gas managers. It cannot be denied that tar has too often been regarded as a nuisance to be disposed of as soon as possible. First-hand experience with the preliminary distillation of tar, backed-up by increased returns, is doing much to change this attitude.

Mr. Curphey concludes by saying: "Combined effort, with high efficiency through skilled control, will always beat individual effort with variable efficiency, and often devoid of specialized control." This is so inherently true, that the words "combined" and "individual" may be interchanged without impairing its universal application.

Aug. 17, 1917. B.Sc.

REGISTER OF PATENTS.

Charging Gas-Retorts.—No. 107,775.

White, A. H.; a communication from the Riter-Conley Manufacturing Company, of Leetsdale, Penn., U.S.A.

No. 5128; April 7, 1916.

The chief object of this invention is to reduce the time required for charging retorts and "ensure that the charges are rendered substantially uniform as to the amount of coal therein."

A charge delivery mechanism and retort-charging mechanism, according to this invention, are rendered active to deliver coal to the retort-charging mechanism and to charge it to the retort—the operations being relatively timed to complete the charge-separating action before the retort-charging mechanism reaches the charge-receiving position. The mechanism for supplying coal charges to the retort-charging mechanism comprises a charge-delivery receptacle supplied with a predetermined amount of coal by a charge-forming and conveying mechanism so as to be in condition for delivering a fresh charge to the retort-charging mechanism when it has returned to the charge-receiving position. In this manner, the time between successive chargings is considerably reduced, as the loss of time required to prepare the succeeding charge after the charging mechanism has returned is practically eliminated.

The cycle of operations of the machine is such that the completion of the charging operation automatically brings into action the discharge of the reserve charge into the retort-charging mechanism, and then automatically brings into action feeding mechanism, which automatically conveys the coal for the succeeding reserve charge to the charge-delivery receptacle—this feeding mechanism operating until the proper amount of coal is delivered to the receptacle, whereupon the feeding operation ceases and the conveying mechanism is (preferably, although not necessarily) reversed, so as to prevent coal from being added to the weighed charge or being otherwise dropped from the conveyor mechanism.

Economical plant operation is further ensured through the ability to provide the charges substantially uniform, by using weight as the controlling factor of the amount of coal contained in the charge—thereby "providing an assurance of the required amount of coal and preventing liability of an excessive quantity being used."

The patentees point out that, as is well known, coal does not run uniformly as to weight per cubic foot; also, that fine coal when damp is fluffy and light, and that the difference between dry fine coal and damp fine coal may amount to as much as 10 p.ct. Consequently, where the amount of coal in the charge is measured by volume, it is almost impossible to maintain uniformity. In addition, the measurement by volume necessitates maintaining excessive heats, since the heat required would be that necessary to carbonize the heavier charges, in which case the lighter charges would be overcarbonized; while if the heat were maintained to carbonize the lighter charges, the heavier charges would be under-carbonized.

By a lengthy specification of eleven pages of print, accompanied by four sheets of lettered drawings, the patentees proceed to deal with the details of the plant to carry out their idea.

Gas Purifying Mass from Iron Scrap and Bisulphate of Soda.—No. 107,807.

Becquevort, P., of Folkestone, and Deguide, C., of Pas de Calais, France.

No. 9747; July 11, 1916.

Nitre cake and scrap iron have been, the patentees point out, used as re-agents in the production of Glauber's salts—hydrogen being evolved during the reaction; and the objects of the present invention are to obtain hydrogen, Glauber's salts free from iron, and a mass of ferric hydrate and calcium sulphate directly available for use in the arts.

It is carried out as follows: Wooden tanks or tanks lined with lead are filled up with bisulphate of soda (SO_4NaH), which is watered in order to be dissolved up to a density of 20° Bé. The solution is added to scrap iron in a tank and heated to about 90° C. by steam injection. The following reaction is the result:

$$2NaHSO_4+Fe=Na_2SO_4+FeSO_4+H_2.$$

The hydrogen produced is washed in scrubbers and then stored in a holder. When the reaction is finished, the reaction tank is emptied and the solution of ferrous sulphate and sulphate of soda (bye-products

of the reaction) is led back into a lower tank. An excess of powdered lime is added to the mass in order to get the following reaction:

$$Na_2SO_4+FeSO_4+H_2O+CaO=Na_2SO_4+CaSO_4+FeH_2O_2.$$

A muddy mass of sulphate of lime and ferrous hydrate ($F_2H_2O_2$), insoluble in the water, is produced, as well as neutral sulphate of soda unaltered by the addition of lime.

While ferrous hydrate is slightly soluble in the water—and this fact would affect the purity of the sulphate of soda when the latter is separated—it is preferable to transform ferrous hydrate into ferric hydrate. For this purpose the mass is aerated and shaken until the whole ferrous hydrate becomes ferric hydrate, according the following reaction:

$$2FeH_2O_2+H_2O+O=Fe_2H_6O_6.$$

This is made easier by the addition of water to the mass and by the injection of a sufficient quantity of air to transform the blackish muddy mass into a reddish mass—this colour being the sign of the end of the reaction. The mass is then filtered by a filter-press; and the liquid which flows away concentrated up to 30° Bé. (density when hot) and led to be crystallized. The solid salt obtained is Glauber's salt, $Na_2SO_4.10H_2O$; while the mass left in the press is a mixture of sulphate of lime and ferric hydrate. Wood sawdust is added in order to make the mass porous. It is then the well-known "Melange de Laming," $CaSO_4+Fe_2H_6O_6$, as utilized in gas-works for purifying the gas from sulphuretted hydrogen and hydro-cyanic acid.

Incandescent Gas-Mantles.—No. 107,874.

DAY, A., of Headingly, Leeds.

No. 13,153; Sept. 16, 1916. No. 17,167; Nov. 30, 1916.

The object of this invention is "to prevent the unnecessary escape of ignited gas and products of combustion at the top of the mantle, and for confining same as much as possible within its interior, and utilizing the gas and the products of combustion for increasing the incandescence and illuminating power of the mantle—at the same time reducing the consumption of gas."

The patentee claims to provide the burner or nozzle portion and the suspension rings used with incandescent mantles with one or more rings of horizontal projections or with one or more recessed flanges (in addition to the ordinary supporting lugs); each ring of projections or the flange having a number of spaces between them, or recesses formed in them. The recesses in one ring or flange are arranged under the lugs supporting the suspension ring and mantle, and when more than one ring of projections or a recessed flange is employed, then the spaces in each additional ring or flange are covered by projections in the succeeding ring or flange. He also combines in a nozzle for an incandescent burner the tubular portion of the nozzle with one ring of horizontal projections or a recessed flange formed on its outer periphery at a suitable distance from its lower end; the projections or the flange having a number of openings or recesses formed between or in them arranged under the recessed projections which support the mantle.

Distillation of Tar Oils and Like Substances. No. 108,004.

GRIMWADE, W. R., of Toorak, near Melbourne.

No. 9770; July 11, 1916.

By way of improving the quality of the pitch obtained from coal tar and facilitating the distillation of the anthracene, it has been proposed (the patentee mentions) to inject hydrocarbons into the tar during the distillation, and to break-up the hydrocarbon into small particles before it has reached the pitch, by means of inert gases—preferably free of oxygen. Absence of oxygen from the still has been recognized as an advantage in preventing discoloration of cresylic acids obtained in distilling blast-furnace tar or the products therefrom. But it does not appear to have been noticed that the objectionable odour of tar oils, carbolic acid, cresylic acid or the like produced by the distillation of coal tar, is due to the presence of oxygen in the still in which the oils or acids are distilled, and to temperature reactions set up during distillation. By this invention it is possible to avoid to a great extent the offensive odour by conducting the distillation in a non-oxidizing and inert gaseous medium—such as atmospheric nitrogen, carbon dioxide, or flue gases.

A practical method of employing the non-oxidizing medium consists in introducing it under pressure to the bottom of the still, and so that it flows in the same path through the condenser as the liquid undergoing distillation, and that the gas flow begins prior to the distillation process. The distillate is condensed in the ordinary way or the condenser delivery is fitted with an enclosed seal connecting with a reflux condenser. It is, however, to be understood, the inventor says, that the methods of condensation are not essential or part of the present process, which resides specifically in the distillation process, although a result of the process defined is to prevent the condensation of offensive smelling constituents of the tar or tar oils. To this end the still has one or more leading-in pipes for the non-oxidizing gas which terminate above the bottom of the still—the gas flowing upwardly and following the same path through the condenser as the liquid under distillation, so that distillation occurs in the current of inert gas.

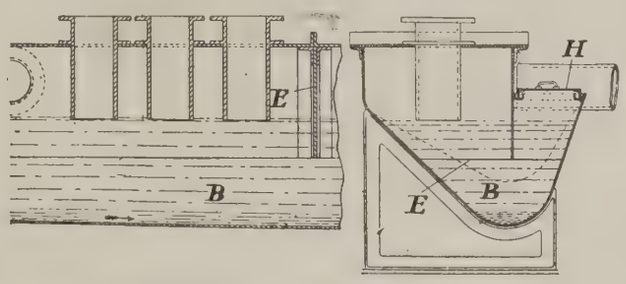
Hydraulic Mains for Gas-Retorts and Other Carbonizing Plant.—No. 108,049.

BLOOR, H. E., and FENWICK, J. B., of York.

No. 11,510; Aug. 15, 1916.

This invention consists in a method of utilizing a continuous hydraulic main as a tar off-take main also—thus dispensing with tar off-take pipes and separate tar-mains, and enabling the tar formed in any number of settings to be drawn off from the hydraulic main directly into the tar-tower. It is characterized by inclining the bottom of the hydraulic towards one end—a fall of 2½ in. per setting being found sufficient to cause the tar to draw effectually as produced. With this inclined form of main are also combined division plates between the settings, not extending to the bottom of the main, but sealing into the tar and liquor in it, "so that settings as a whole may be left uncharged, and so that gas cannot in any circumstances pass from the sections of the main which are in use to those which are out of commission."

The arrangement was described by Mr. Bloor in the course of a paper read before the North of England Gas Managers' Association last May [see "JOURNAL" for May 15, p. 296].



Bloor and Fenwick's Continuous Hydraulic Main.

The illustration shows a part longitudinal sectional elevation of part of a continuous inclined hydraulic main; also a cross-sectional elevation.

In order to permit of any one or more of the retort-settings remaining out of action while the others are working, the main B is provided with vertical division plates E forming a joint with the cover and sides of the main, but not extending to the bottom of the main—ample space being left for the flow of tar. The main may extend over the tar-tower where one is used; so that the tar draws directly into the tower. But if this arrangement be inconvenient, a short connecting pipe may be provided. In order to regulate the depth of liquor in the hydraulic, a weir valve is provided on the end of the main, and is operated in the usual manner. The main is preferably provided with loose side seal covers H or with otherwise open sides to facilitate inspection and cleaning.

The arrangement is said to combine the following advantages: No separate tar-mains or branches are required; regular flow of tar as produced; any setting or settings can remain idle; no stoppages of the ascension pipes; no clogging-up of the hydraulic main; the retention of a liquor seal to the dip-pipes; and the ready means of inspection of the hydraulic main without any interruption in the working of the plant.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Women Bricklayers at the South Metropolitan Gas-Works.

Mr. BECKETT asked the Minister of Labour whether he had received a complaint to the effect that the South Metropolitan Gas Company were employing women to do bricklayers' work; whether there were men over military age who were available to do this work and who were at present out of employment; and, if so, what action he proposed to take in the matter?

Mr. BRIDGEMAN replied that the Minister of Labour had received a complaint on this subject, and from information received he thought that the complaint as stated may be correct. He was communicating with the Company in the matter.

Sheffield Gas Company and Women Workers.

Mr. WILL THORNE asked the Minister of Munitions if he was aware that the Sheffield Gas Company (partially a controlled firm) were only paying the women workers 25s. 6d. per week for fifty-three hours, and whether he intended insisting upon the Company paying the woman workers in accordance with the circulars already sent out in the recent award that had been given to women for an extra 2s. 6d. per week on the present rates of pay.

Mr. KELLAWAY, in reply, said that no gas company in Sheffield was controlled. If the question referred to the Sheffield United Gas Light Company, this was a certified undertaking. Orders applying to certified undertakings the regulations as to women's wages which were in force in controlled establishments were now in preparation. They would include the Order prescribing the advance of 2s. 6d. per week, and would operate from Sept. 1.

The Ashton Chemical Works Explosion.

Mr. NEEDHAM asked the Minister of Munitions whether he had received claims for damage done to industrial property due to the explosion at Ashton-under-yne, and whether he would expedite the examination of such claims and the payment thereof.

Mr. KELLAWAY said a number of such claims had been received. The Ministry's Assessors were dealing as rapidly as possible with them, and over one-third had already been paid. The Ministry were not legally liable for these claims, but had assumed responsibility to make good any deficiency; and negotiations were pending with those primarily liable.

Electricity Undertakings and Rate-Aid.—In a second report issued by the Committee for the Inter-Connection of the Lancashire and Cheshire Electric Supply Systems, the opinion is expressed that the practice of making profits for the purpose of handing over substantial grants in aid of the local rates is detrimental to the interests of an adequate and economical supply of electricity.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the proprietors was held last Wednesday, at the Cannon Street Hotel—Mr. Charles Carpenter, D.Sc., in the chair.

The Secretary (Mr. F. M'Leod) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting. The seal of the Company was then affixed to the "Register of Proprietors."

The Chairman's Address.

The Chairman: Ladies and Gentlemen,—I assume you will, as is customary, take as read the report and accounts which have been duly circulated; and I will now proceed to move their adoption. As both the report and the accounts tell you, in order to balance our expenditure we have had to bring in surpluses accumulated from last year's operations. It has not been our custom to budget for a large carry-forward; and if we had any idea of any variation in this policy we have now the excess profits tax staring us in the face. I think shareholders will agree that it is better to cut things fine, and work to a close margin, rather than be placed in the anomalous position of paying to the Government, over and above the present heavy taxation, a large proportion of profits simultaneously with the shareholders receiving dividends considerably below pre-war figures. Yet this is exactly what would happen unless, by lowering the price of gas, we keep our profit within the margin allowed by the comparison year. So that we adopt the principle, with your support, of reducing the price of gas to give us something like pre-war figures. This, I think, is quite a legitimate and proper thing for us to do. It prevents the accumulation of funds which would doubtless help us in the future; but, on the other hand, it would be absurd to build up a large surplus of which we should have to pay a large proportion to the Government. So we cut our budget as fine as we can, in order to avoid having a surplus making each half year stand upon its own figures. The disadvantage of this is that you get a varying return upon your shares each half year. On the other hand, if the half year is favourable, you get an advantage, though at the same time you are free of having to pay excess profits tax; and considering that our dividend is reduced largely from what it was in pre-war times, I think that is the proper policy to follow. The man in the street would probably find it difficult to understand why gas companies should be excluded from the provisions of an Act regulating profits made as a result of the war; and if this were all the Act did, we should be the last to complain. I have in mind the instance of a large fuel-supplying company who charged so highly for their services that they were not only able to declare handsome dividends after paying the usual heavy taxation, but to make substantial provision for the future. An exception should certainly have been made in the case of statutory gas undertakings working under sliding-scales; for their dividends depend, not upon how dearly they can make the nation pay for its necessities, but upon how cheaply they can provide them. As regards the various bye-products of gas making required by the Government, it fixes its own prices for them; so that gas undertakings are automatically relieved of any temptation in the direction of profiteering—another name, I suppose, for taking advantage of the nation's need for the purpose of extra gain. While speaking of profits, I ought to remind you of a circumstance noted in the second paragraph of the report, the significance of which might easily escape notice. It is that the price of gas has been raised to 3s. 1d. per 1000 c.ft. Now this is the standard price of gas, at which figure we are entitled to pay 4 p.ct. upon our ordinary stock; so that the dividend for the current half year will be at that reduced figure. There is every reason to think we shall get through to the termination of the war at no lower rate, in which case I think we shall have cause for congratulations, despite the very obvious hardships the fall in interest entails.

Labour and Raw Materials.

Our main expenses are, of course, for labour and raw materials. If further increase in the cost of living is checked, and even reduced, as one is entitled to hope will now be the case, labour should be content with its present remuneration; and a maximum price having been fixed for coal, we should have reached the peak in our costs with present prices. As long as this continues to be the case, I do not see how we could expect relief from Parliament while the war rages.

Sliding-Scale Revision.

I mention this because there is a fairly widespread conviction that the existing sliding-scale basis of apportioning charges and profits has broken down. It was certainly never made for war-time conditions. It was designed primarily as an inducement to gas undertakings to carry on their businesses with good care and management, by the possibility thereby of dividing increased profits; but it was never contemplated that our raw material—coal—would treble in cost. When we last went to Parliament in 1900 and settled the present sliding-scale, the standard price was 3s. 1d. per 1000 c.ft. and coal was being delivered in our works at about 10s. 6d. per ton, while the present price is something nearer 30s.—sometimes more and sometimes less, but practically we are working under a sliding-scale which was fixed at a time when all our important raw materials were delivered at the works at something like a third of present prices. It is obvious that a complete revision of our sliding-scale must be made to suit altered conditions; but as future prices both of labour and raw material are so uncertain I cannot think that in the midst of war would be an opportune time unless the unlikely happens, and working costs become seriously higher. In this connection, we must not forget that, in common with other coal-users, we owe something to the fixing of a maximum price. If the price of coal had been allowed to get as out of hand as was that of freight, the consequences would have been serious in the extreme, and we must bear this in mind when we think of the sliding-scale trouble. The other dominant factor is, as I have stated, the remuneration of our employees. The cost of war allowances to those fighting for our country and for those left behind to carry on, have, as the report tells you, been at the rate of over 4d. per 1000 c.ft. of gas—at the present time, they are, in fact, about 5d. I cannot think either you or the consumers will grudge this contribution, heavy though it undoubtedly is. We have dealt fairly with our workpeople—neither with a niggardly nor extravagant hand; and I am sure they are appreciative of the sacrifices made on their behalf, as we are of the devotion they show to their employers under very trying circumstances. We are in a very different position to most of the large industrial associations of the country whose employees are making large wages. We cannot compete with those; and our employees are suffering in many cases. In some adjacent factories engaged in munition work, owing to the high rate of wages paid, the cost of food is high. It can be well paid, however, by those earning high wages; but the employees of gas companies are in comparison handicapped in purchasing the necessaries of life. How to get over this, I do not know. Therefore, I say we are appreciative of the loyalty of our staff in circumstances of very great difficulty.

Coal Stocks.

Another heavy item of expenditure referred to in the same paragraph of the report is that of interest—that is, other than on debenture stock. You will not be surprised at this if you look at our large indebtedness to our bankers. This, as I have before stated, arises from the fact that materials are so much dearer, that we require a greater floating balance to deal with them. Coal is the outstanding instance. The Controller tells us we must take in greatly increased stocks; and we have done, and are doing, so. We have had quite a reversal of the usual practice—we have had to increase stocks in the summer instead of letting them run down. No man can hesitate for a single moment in expressing an opinion as to the importance of the matter; for it would be futile to rely on getting coal in the winter when the days are shorter, so we must get it in during the summer. And the coal and other materials have to be paid for. We are paying for the coal week by week, though we shall not until next spring receive back the cost through the gas accounts. I walked round one of our large stacks the other day; it was over three-quarters of a mile in circumference. The correctness of the policy of holding such large stocks is undoubted.

An Issue of Temporary Capital.

This state of things arises, of course, entirely out of war conditions; and it is in order to meet them that we are issuing what may be called temporary capital, to enable us to carry on under these exceptional conditions without being saddled afterwards with surplus of capital and constituting a permanent charge for interest. In order to provide for these special difficulties, we came before you at the last summer meeting and asked your consent for raising extra capital. It is obvious we cannot go on with heavy loans from our bankers; and we therefore decided to obtain further capital powers. We have recently decided to issue £250,000 of 5 p.ct. stock, at 94. The practice with regard to the issue of stock in war times is not the same as in times of peace; and after taking advice, this is the figure at which we decided to issue. You will see by the papers to-morrow the announcement that the stock is on the market. It will be redeemable stock, as we do not wish to have an exceptional amount of stock hanging round our neck when things become normal. I ought to mention, with regard to the debentures (as they are referred to in the report) that it is proposed to raise temporary capital to the extent of £750,000. Of this, £500,000 is in respect of debentures; but we do not propose to make a public issue of these—that will be a matter of arrangement between ourselves and our bankers.

A Remarkable Increase in Gas Sales.

I have dealt, I hope, adequately with the more sombre features of the accounts. There is fortunately an excellent silver lining to the clouds upon our working. First I must mention the remarkable increase in the sales of gas, which, as the report tells you, have exceeded 12 p.ct. I think this is a unique experience in the Company's history; and it says much for our officials and their organization that they have been able to cope with it in circumstances of great difficulty. This expansion of the demand, arising partly from industrial needs, very forcibly brings home to us what the authorities are now awakening to—namely, that gas companies have ceased to be purely a public necessity, and have become a national one. The nation must entrust them to a greater extent than ever before with the utilization of our coal resources. It has begun to realize that the one industry which holds the position of pre-eminence in this respect is that devoted to the scientific carbonization of coal and the distribution of the products therefrom—liquid, solid, and gaseous. It needed the war to stamp this fact upon the official mind; and the imprint is not likely ever again to become blurred.

The Gas Industry and "Reconstruction."

Gas undertakings must have an important share in reconstruction after the war. The official request to use gas wherever possible is not likely soon to be discontinued or forgotten. The nation has got to shoulder many responsibilities it ignored or evaded in the past. It must deal with the smoke question upon broad and comprehensive lines; and I am glad to know it is one of the problems engaging the earnest consideration of the Fuel Board connected with the recently-formed Department of Scientific and Industrial Research. I have every reason to believe that this Company will be associated with the experiments called for in the inquiry. As gas makers we have in the past sacrificed, perhaps, too much in an endeavour to obtain the highest yield of our chief product, gas. So long as the Government took no interest in encouraging the nation to become self-supporting, and appeared to rejoice in the import of necessities, there was no possibility of our following another policy. Why should the country have imported enormous quantities of oil for the purpose of making gas to light and heat our towns and cities, while at the same time we were exporting enormous quantities of raw coal, much of which would be used against us by our industrial competitors? We can greatly increase our own liquid fuel supplies, whether for use under boilers or in motor engines, if to do so is made part of a broad comprehensive scheme of national policy.

At the present time we can take no other course than to follow the dictates of the Government, who are responsible for carrying on the war. But upon its completion, we shall certainly require to have a voice and to take a part in what is euphemistically called "Reconstruction," but which is only another expression for taking to heart and utilizing the lessons taught us by the war.

THE COMPANY'S CARRYING FLEET.

As an undertaking I am free to confess we have shared in the general awakening. The most practical instance I can give is that of coal transport, where the possession of our own colliers has proved a very great advantage and security. I hope there will be no difficulty in the way of our handling the whole of our requirements with respect to fuel. There will be this collateral advantage—that in the summer time we shall be able to employ some of our steamers in transporting to foreign countries our bye-products. We are entitled to look forward to the time when we shall export as a nation not so much raw coal as the products of coal; and our fleet of steamers will be available in the summer months for dealing with this class of business.

A TRIBUTE TO LABOUR.—THE WOMEN WORKERS.

Lastly, but not of least importance, I must say a word on behalf of the Company's staff and employees of all ranks. One half of our pre-war complement are now serving in His Majesty's Forces; their places having been taken by male and female substitutes in about equal proportion. All have thrown themselves into their new tasks with courage and earnestness; and if I single out for special commendation the female workers, it is because their changed environment has been so radical in its character. You all know of what a special nature is the work carried on in the retort-houses in the process of machine gas-stoking. This work is to-day being carried out in a portion of one of our large works entirely by female labour. And it is not only being carried out, but efficiently so. It has been to me one of the practical revelations of the part women can play if the emergency arises—there may be Amazons not only on the battlefield, but upon the more prosaic grounds occupied by our industrial manufactories. They have been an enormous help to us in our present difficulties; and I am glad to have this opportunity of paying tribute to their zeal and earnestness, as well as to those who have so patiently and so disinterestedly taught and coached them in their many novel tasks. There are many kinds of employment in which females are doing useful work, such as the repair of meters, stoves, and altering prepayment meters. At the present time, to our coin meters, which have an attachment so that when you put a coin in you get out a certain quantity of gas, we have had to send round and adjust the mechanism so as to alter the amount of gas which the penny would provide. All this work has been successfully done by female labour. There is no limit to what can be done in many ways which no one could have realized before the war.

I think I have dealt with all the matters covered by the report; and I beg formally to move—"That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The DEPUTY-CHAIRMAN (Mr. Frank H. Jones) seconded the resolution.

The CHAIRMAN: The matter is now open for discussion.

SHAREHOLDERS' REMARKS.

Mr. PRICE said there were one or two items in the balance-sheet as to which he should like some explanation. The first was expenditure on new buildings and machinery £86,420, which seemed somewhat excessive. The next item was "interest on temporary loans and deposits £25,409," which came to about £1000 each week. This amount had increased year by year. In 6, 7, and 8 there were large sums "to be invested;" and he should like to know where the money was. If not in the bank, it must be in the business; and he considered the money should be invested outside the business, so that, in case of accident, it could be at once realized. Then in regard to "War Loan, £237,500"—was this the actual value or the face value? He recollected the time when the shares were issued at 132 and 128, though the highest he paid was 120; and it was not very pleasant to see the stock quoted at the present price. The Chairman might say they were all in the same boat; but he did not like to see £750,000 being issued at 94. He should like to know when the new stock would be redeemed; and what rate of interest it would bear. Every year the bank indebtedness appeared to be increasing; and if the £750,000 was to pay this off, that was increasing the capital. He hoped the shareholders would protest against the loans being increased.

Mr. A. M. PADDON said he could not agree with the last speaker, as he thought that if the Directors had not contracted the loan, they would have acted in defiance of every sound principle of finance. The business of the Company had increased by 12 p.ct.; and if this were worked out in millions, it would be seen that the loan would very little more than provide the financial means of conducting the increased business. If the Directors had not contracted the loan, what course would have been open to them? They could not have gone to the public for the money. He was firmly convinced that it was better to borrow. It was self-evidence of sound finance that the Directors had done what they had done. If they had not done this, they would have dissociated themselves from every sound precedent of gas administration in the past. With regard to the question of the standard price in relation to the sliding-scale, which was a most important subject, the question merited every word that the Chairman had devoted to it—in fact, he had left nothing for anyone else to say. But there remained in connection with it just one issue which might be qualified by a very slight difference of opinion. It was a question as to whether the readjustment of the sliding-scale should stand over *sine die*, until the end of the war; and as to when that would be, he did not know. Before the question could be readjusted they would have to convince Parliament (or some authority constituted by Parliament) as to the soundness of the application. A concrete hardship was a great deal easier to argue than an abstract grievance: and when the war was over the immediate causes of the difficulty under which they laboured might have disappeared, and the Government might say, "Time will constitute your cure." After the war had ceased it was not gas companies alone who would have to apply to Parliament for a revision of the conditions under which they carried on business; and there might be such a congestion of urgent matters to be considered that gas companies might not get the full and deliberate treatment the matter merited. The Company might well look at the question from its own point of view, because the sliding-scale had its genesis in the South Metropolitan Company. But there was this to be said, that most of the great gas companies in the country were involved in its practice, and not one would be heard in Parliament until the claims of the South Metropolitan Company and its larger neighbour had been considered. He might be forgiven for being a little anxious in hoping that the question would be taken up in Parliament at an early date; and if the Chairman could anticipate that date, with his considerable influence with Parliament, he would be bringing a great measure of relief to those who found the sliding-scale in these times almost intolerable in its application. In conclusion, he congratulated the Directors upon their admirable management, as they were able to declare a dividend 30 p.ct. in excess of their great neighbour. Another thing they were to be congratulated upon was the fact that they were to be selected for Governmental experiment.

Mr. HAVELOCK WEST said he would like to know how many boats the Company possessed, and whether any loss had been sustained through the war. Considering that freight had increased from 3s. to 20s., he thought the sliding-scale had created a great injustice to them, as they had not been able to benefit, like many profiteers, by the rise in price of everything. He hoped that as soon as the war was over, something would be done in the matter of the sliding-scale, as it did not work at all well. With regard to the large stocks of coal, he hoped that every protection would be taken against spontaneous combustion. He was very pleased to hear that the female staff were doing such remarkably good work; and he hoped that after the war was over the Company would be able to continue to employ some of them.

The CHAIRMAN: If no one else has any remarks to make, I will do my best to reply to the various speakers, dealing with the last one first. With regard to the employment of women, there was no doubt they had come to stay, though to what extent it was impossible to prophesy. With regard to the spontaneous combustion of coal, this was a matter which had for many years past engaged the attention of all authorities who had to stack coal—not only here but on the Continent and in America; and it was found that the only absolute remedy was to have the coal-stores wholly enclosed, so that the store might be filled with water. This was impracticable when dealing with coal at their stores. The Admiralty had made many experiments in reference to the matter, and many means had been suggested with regard to obviating the danger. At one time, the Company were considerably troubled with regard to spontaneous combustion; but to-day they have no fear about it whatever. It is simply a question of using a large quantity of water. During the half year, we have lost ships; but we are providing others, either by purchasing on the market or by having new ones laid down. As to the issue of the new stock, the Board have taken the responsibility of fixing the issue price at 94; and if the stock is taken up at this figure, it will show that the Board was right and that Mr. Havelock West was wrong. At any rate, the responsibility is ours; and we have every reason to believe the stock will fetch the price which has been fixed. I need not say that we shall welcome any applications from shareholders of the Company. In reply to the speaker who dealt with the sliding scale, I may say that I admit the hardships; but it is not a bit of good to blame the Board for them. The conditions were settled in peace time; and everybody thought it was a good thing and that gas shareholders would profit by it. Under war times, it is out of date; and we think Parliament would be sympathetic in getting it altered. The Government have controlled railways, and their dividends; and it is said why should they not do the same for gas companies? There was a very good reason why they should not. In the case of railway companies the matter was of importance, in order to utilize the whole of the rolling stock for the purposes of the country. It has enabled a very considerable portion of the track to be pulled up and sent over to France; and it has also released a large number of locomotives and rolling stock, which have been transferred to France. It has further enabled a reduction to be made in the number of trains running to the same place on parallel lines. Why should the Government take over the gas companies? It would be simply to maintain their dividends; and I cannot imagine their doing so. The Board are fully alive to the hardness of the sliding-scale, where the stock is held by those least able to bear the loss through reduction of dividend. All we can do is to wait with our eyes open; and when the Board see it is possible to make a move, they will do so. One speaker referred to the capital account and the amount of the loans. But there is this important thing to bear in mind with regard to this question. If you take the accounts for the last ten years, you will find that the capital has not increased at the same rate as the business. The business to-day is done at a less expenditure of capital than in the past; but you cannot run an increasing business unless you have the capital to do it with. One might say the alternative was to refuse to do the work. But we can only go on as consumers make demands upon us; and it is impossible to supply an increased quantity of gas unless we have the means. Now as to "Capital Account, No. 3." The expenditure on new building was necessary for our business. We cannot do the business we have to do unless we provide the necessary capital. There is a temporary loan of £815,000. Our business was built-up on a capital requiring payment for coal at the rate of 6s. or 7s. per ton free on board, with 3s. per ton for freight. This roughly gave a rate of 10s. per ton. But the raw material now costs 30s. per ton. There was nearly a million pounds worth of stores on hand. So long as you are dealing with raw materias, and their manufactured products largely increasing in value, you must have a large amount of capital to deal with it. You have to issue new capital or borrow money; and no one who has had any experience of financial undertakings could come to any other conclusion than that the decision of the Board not to increase the permanent capital, but to make the best temporary arrangement possible, so as to carry us over difficult times, was the right one. ["Hear, hear."] We have done the only possible thing to carry out

this policy. [Cheers.] No one welcomes more than I do criticisms on our working, as it shows that people take an interest in our affairs, and I can assure you we have nothing to hide. In this particular case no suggestion was made that we should stop our business—which of course we cannot do—and if we are to continue it, we must provide the necessary means to carry it on. [Applause.] With regard to the investment of the various funds, I think that in times like these we are justified in using everything that will help us to meet such exceptional conditions.

The resolution was put and carried.

The Dividend.

The Chairman: I have to propose:

> "That a dividend at the rate of £4 13s. 4d. p.ct. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post."

Mr. John Mews seconded the motion, which was put and carried.

The Chairman: Ladies and gentlemen, that is all the business.

Votes of Thanks.

Mr. Price had much pleasure in moving a vote of thanks to the Chairman for his admirable address and for the lucid way in which he had answered the various questions that had been put.

Mr. Havelock West seconded the motion, which was carried unanimously.

The Chairman: I thank you very heartily indeed for your kind vote. I believe I deserve it more to-day than at any other period of my association with the Company. It has been a trying and a difficult time for us; but I think the future of the Company is absolutely bound-up with my own. In conclusion I would like to take the opportunity of proposing a vote of thanks to the officials and the staff for the admirable manner in which they have carried on the business in anxious circumstances.

Mr. Price had much pleasure in seconding the motion, which was put and carried unanimously.

Mr. G. M. Gill, on behalf of the engineering staff and workmen, thanked the proprietors for their kindly references to them. He had only been connected with the Company for eighteen months; but he had been greatly impressed by the loyalty shown by the workmen. It was a great pleasure to be brought into contact with such men. The increase of 12 p.ct. in the sale of gas was equal to an amount that would supply a town like Cardiff; and it meant carbonizing 60,000 tons of coal. The increased production of sulphate of ammonia thereby was of great importance from an agricultural point of view.

Mr. F. M'Leod, on behalf of the clerical and commercial departments, said he appreciated very much this kind vote of thanks. The depletion of the staff had been felt most acutely. The assistance rendered by the women was of great value; and he looked with every confidence to the future—feeling sure that, when they next met, the outlook would be more rosy than it was now.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. Bradshaw in the chair.

The Secretary (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

Considering Annual Meetings.

The Chairman, in moving the adoption of the report and accounts, said: I always feel that we ought to apologize for bringing you here to a general meeting of the Company in the middle of August, which to most people is the holiday month; and I think that we are all coming to the conclusion that half-yearly meetings are out of date, and are really not as useful as are annual meetings, because a comparison of a whole year's accounts, &c., with those of the previous year gives a much clearer view of the position and progress of the Company than is afforded by a more frequent comparison. Half-yearly meetings were considered necessary in the early days of joint-stock enterprise, in order, I think, to keep the control in the shareholders' hands, and to maintain a close connection between them and the Directors. But experience has shown that the shareholders get a better knowledge of the Company's affairs by yearly meetings; and many important companies, including all the great banks, pay an interim dividend at the half year, render yearly accounts, and meet the shareholders annually. I say this because it may be wise, when next we go to Parliament, to obtain powers to modify the present obligation to hold half-yearly meetings; and I put that forward for your consideration.

Heavy Increase of Cost, but Extension of Business at Higher Prices.

The outstanding feature of the accounts which we present to you to-day is the continuance of the increase in the cost of labour and raw materials which has been taking place ever since the commencement of the war. Evidence of this is found in the fact that, while our sales of gas have grown since the last pre-war half year by 13½ p.ct., the expenditure on revenue account has increased by no less than 53·8 p.ct. The weekly bonus paid to our workers to meet the extra cost of living has grown from 5s. to 10s., and from 10s. to 15s. The cost of coal into the works, which for the first half of the year of 1914 was 17s. 9d. per ton, has increased to 28s. 6d. per ton for the last half year. Oil, which in 1914 cost us approximately 3d. per gallon, is now nearly 1s. per gallon; while necessary repairs and extensions to plant are almost proportionally expensive. Of course, the return from residual products has expanded; but we have had to increase the price of gas first from 2s. 4d. to 2s. 8d., then to 3s., and now, since the 1st of July, we are charging 3s. 2d. per 1000 c.ft. It is unfortunately impossible to say that we shall not have to raise the price still further. You will, however, be glad to know that, in spite of the increased price, the sales of gas for the half year under review show an increase of no less than 8 p.ct., which is the largest increase this Company has ever experienced. I believe the Gas Light and Coke Company had an increase of 10 p.ct.; and the South Metropolitan Company one of 12 p.ct.

Overdrawn Capital and the Cause.

The next feature of the accounts which will strike you is that the capital account is now overdrawn by £140,630. You will see that last half year we spent £57,034, which is, of course, far more than we have ever had to expend in one half year before. In the winter of last year, our ships were so much delayed by bad weather and submarine threats that our coal stocks were dangerously depleted, and for more than two months in the depth of winter we had a very anxious time indeed. It would not have been right to run the risk of a similar experience next winter, and the only remedy was to purchase more ships. This we have done by buying two ships of an aggregate carrying capacity of nearly 2000 tons. The Company's fleet now consists of eight ships—we think ample for all requirements under almost any conditions. When at last the war is over, and our ships sail under normal conditions,-we anticipate that we shall be able to sell some of them, and probably at very good prices; but while it lasts the increased number of ships is a necessary provision for the safety of the Company. You will see we have also had to spend considerable sums on capital account to provide plant for Government requirements in toluol, benzol, and concentrated ammonia. Then you will observe at the end of the balance-sheet that we had a loan from our bankers at the end of June of £210,000. The large amount of the loan is due, first, to the overdraft on our capital account; secondly, to the large stocks of coal, oil, and other materials which considerations of security compel us to maintain; thirdly, the high prices at which these stocks necessarily stand in our books—stores in hand figuring at £162,847, compared with £82,843 this time last year, and a normal amount is somewhere about £70,000 to £80,000; and, fourthly, to the unusually heavy amount due to the Company for gas and residuals, the sum due this year being £145,000, while last year it was only £98,000. This large bank loan, which is more likely under the present conditions to increase than to grow less, naturally points to the need of further capital. But, although we have capital powers unexhausted to the extent of £228,000, it would entail a very heavy permanent burden on the concern if we were to issue either ordinary stock or debenture stock at the prices which prevail now; and it may be thought wise to ask Parliament to give us power to issue capital stock or loan stock redeemable in a certain number of years, and in this way to meet the emergency caused by the war without putting a permanent burden upon the concern. You will have seen that steps have already been taken by the South Metropolitan Gas Company. They went to Parliament for powers last year, and are now putting into force the powers then received.

The Increase in the Sale of Gas.

The large increase in the sale of gas to which I alluded, representing 8 p.ct., or 142½ million c.ft., has been brought about principally by these causes: First by the heavy demand for gas for the manufacture of munitions and for other industrial purposes; secondly, by the substitution of gas for solid fuel for domestic uses; and, thirdly, by the severe weather experienced in the early months of the year. In recent years in our district, increased sales of gas have taken place almost exclusively through prepayment meters; but there was an increase in the half year under review of 11·15 p.ct. through ordinary meters, and only 2·66 per cent. through prepayment meters. Undoubtedly the supply of gaseous fuel has been a great boon to manufacturers and traders, as well as to the poorer classes of the residents in our district, at a time when, owing to the difficulty of transporting it to London, coal was so scarce and so dear. I think we may confidently expect that, when peace conditions enable us once more to cheapen the supply, we shall be able to retain a large portion of the increased trade which the war has brought to us. The country, I believe, is slowly awaking to the fact that the use of gas, which preserves to the nation the valuable products contained in coal tar, must be encouraged in peace times as well as war times if we are to compete successfully with foreign trade rivals; and steps must be taken to discourage and bring to an end the wasteful consumption of coal in open grates. At the present time, the Government are urging gas companies to use every effort to increase the manufacture of rich tar in order to maintain the supply of high explosives; and I need not tell you we are straining every nerve to comply with the demand. We are also aiding in the prosecution of the war by smelting metals for shell fuses by means of our patent gas-furnaces, which we are told by Government officials fuse the metals more satisfactorily than any other form of furnace. You may rest assured that all that we can do to help the country at this time of crisis will be done willingly by our officers and employees. It is interesting to note that for the first time we made over 2000 million c.ft. of gas in a half year. I notice on looking at my book of statistics, that it was in the second half of the year 1888 that the Company first manufactured 1000 million c.ft. This is of special interest to me; for I became a Director that half year, and consequently I have seen the Company double its output in the 29 years during which I have been officially connected with it.

More Information as to Costs of Materials.

I drew your attention just now to the enormous increase in the cost of our raw materials; and I think that some further explanation is necessary to enable you to understand the position. Coals, which (as I pointed out) in the first half of 1914 cost 17s. 9d. into the works, cost in 1917 28s. 6d., which is an increase of 61½ p.ct. But while the price of coal f.o.b. in the North has advanced in the three years by 3s. 2d. per ton, which represents 23 p.ct. on the 1914 price, the cost of freight has increased by no less than 7s. 8¼d. per ton, which is 190 p.ct. A very large part of the extra cost of freight is due to the very high premiums which have to be paid for insurance against marine and war risks. In pre-war days the cost of marine insurance was less than £3000 for the half year. In the half year under consideration, the cost of insurance, including war risks, was over £30,000; and in the current half year we estimate that it will exceed £50,000, which represents 6¼d. per 1000 c.ft. on the price of gas. This is not all; for a

very large part of the increase in the price of oil is due to the additional cost of freight and insurance. You will see that we have practically no option in the matter, and that it is not likely that there will be any relief until peace is declared. The inevitable delays which occur to shipping in war time, of course, add to the cost; but while the running of our ships was very bad in the first three months of the year, when our stocks of coal were low, and the demand for gas unusually heavy, I am glad to say there has been a marked improvement during the last three months.

CHANGES IN THE REVENUE ACCOUNT.

Now, turning to the revenue account, I will briefly point out the changes which have taken place in different items comparing them with the corresponding half of 1916. The income from gas is £253,062, compared with £226,336 in 1916—an increase of £26,726, which is due partly to additional sales, and partly to the fact that during the second quarter of the year (in which, being a summer quarter, a smaller quantity of gas is sold) we were charging 3s., instead of 2s. 8d., per 1000 c.ft. The rental from meters and stoves was more by £1432, and residuals show a gain of £20,538; so our total income was more by £48,696. On the other side of the account, coals and oil cost more by £59,699, manufacture more by £4119, distribution more by £3099, and management more by £1914, and other expenses were more on balance by £6283—making a total increase in expenditure of £75,114; so that the balance of profit (which was £41,732 in 1917, and £68,151 in 1916) was less by £26,418. In the expenditure is included a charge of £22,495 for war bonus paid during the half year, and a sum of £3572 allowances to employees on active service—a total of £26,067, whereas in the corresponding half of last year, these charges only amounted to £12,067.

THE FINANCIAL RESULT, AND THE EFFECTS OF THE INCREASED PRICE.

The net result of the half-year's work is shown in the net revenue account, and stated briefly is as follows: At the beginning of the half year, there was brought forward a sum of undivided profit amounting to £75,867. Adding the balance of profit £41,732, and deducting the interest on debenture stock and the temporary loan, together amounting to £12,754, leaves £104,845 available for dividend. The dividend at the rate of £4 8s. p.ct. on the 4 p.ct stock (which is 10s. 8d. p.ct. less than last year owing to the increase of 4d. per 1000 c.ft. in the price of gas), and 4 p.ct. on the 3½ p.ct. stock (which is 13s. 4d. p.ct. less) amounts to £44,492; leaving £60,353 to be carried forward to the current half year. Briefly, we have earned £15,513 less than the dividend which we recommend. Since the war began, we have reduced our undivided profit by £19,216. We realize that it is now necessary so to adjust the price of gas that the Company shall earn its statutory dividend, which is a very moderate one indeed. The consumers, shareholders, and employees, who are profit-sharers, are partners in the concern; and all alike have suffered owing to the heavy burden which the war has placed upon the Company. The consumers have had the price raised by 10d.—the charge for gas being 3s. 2d. since July 1; the shareholders have had their dividends reduced; and the employees have seen their profit-sharing bonus almost approach vanishing-point. It was 6 p.ct. on their wages before the war; last half year it was only 3 p.ct. on an average price of 2s. 10d.; and now it is only 1 p.ct.—the price of gas being 3s. 2d. Of course, I should point out that all the employees, except those receiving the higher salaries, have received the war bonus; but that bonus was given to meet the extra cost of food and clothing, while the profit-sharing bonus was given as a reward for, and an incentive to, zealous work.

THE EMPLOYEES AT HOME, AND THE MEN AT THE FRONT.

I cannot conclude my remarks without mentioning to you the good and faithful service which we have received from all ranks and classes of the Company's employees. The Company's marine staff—the crews of our ships—have persevered in bringing our supplies of coal in the face of numberless dangers from mines and submarines; and we owe them a very heavy debt of gratitude for their courage and hardihood. The girls and women, who have taken the place of the men serving in the army, have zealously and bravely undertaken work which in pre-war days we should have deemed to be impossible for them. The men who are exempt from military service, by age or some other infirmity, have laboured indefatigably to get the work done under difficult circumstances, so that the Company should not suffer by reason of the staff being depleted. In fact, all the work of the Company has been done by all loyally, faithfully, and willingly. I regret to say that nine of our staff have lost their lives during the half year, bringing up the death roll to 22 out of a total number of 342 men serving in His Majesty's forces. Who can estimate the debt that we owe to those who are nobly offering their lives for us, for their King and for their country, and for the cause of liberty and right? We are sometimes inclined to repine at the troubles which the war has brought upon us; if so, let us compare them with the sacrifice which those have made who have offered up their lives for us.

PREPARATION AND WILLING WORKERS.

Now, for the current half year doubtless there are difficulties before us; but I can say that we are in a better position to meet them than we were last year. Our stocks of coal and oil are largely increased; our fleet of ships has been considerably augmented, and should be ample for our requirements; and, so far as I see, we ought to be able to meet every demand made upon us. At any rate, I can assure you that you can rely upon all in the Company's service doing their best work to secure its continued prosperity.

The DEPUTY-CHAIRMAN (Mr. H. E. Jones), in seconding, said the proprietors had heard from the Chairman a full and lucid account of the Company's proceedings, and they must be convinced how grave and serious had been the burdens upon the whole staff, and among others upon the Directors.

Mr. S. M. WOOD remarked that in the balance-sheet, under accounts due to the Company, was an item "Sundries £40,577."

The CHAIRMAN said he thought somebody would notice that, and he ought to have explained it. The amount was very high; and a large part of it was due to the fact that their insurances for ships were paid in advance. They insured the ships ahead, and took credit for this in the balance-sheet. Some £7000 was also included for munitions, fittings, and stoves; but it was all good money.

Mr. WOOD also inquired where the amount appeared that was received from the Government.

The CHAIRMAN: Under the head of residual products.

Mr. W. GROVES thanked the Chairman for the lucidity of his statement, for the gracious reference to the men and women who were doing the work at home, and for his sympathetic allusion to those who had laid down their lives, and to those who were working in the interests of not only the country, but the Company, out at the front. The proprietors were glad to hear that, in spite of the increase in the price of gas, the consumption had gone up considerably, which evidently showed that gas was a thing that could not be done without. He was glad to hear the Company had an efficient fleet of eight vessels; but he should like to know whether there was any guarantee that the Government would not commandeer them. Was there any arrangement that gas companies' vessels should be exempt? Another point was the quantity of gas unaccounted for—168,576,000 c.ft., approaching 8 p.ct. of the total production. What was the probable cause of this?

The CHAIRMAN replied that they had no guarantee whatever that the Government would not requisition their ships; but the Government were fully alive to the necessity of keeping gas companies well supplied with coal. This was one reason why they would not requisition their ships. Another reason was that the Company's ships were small, because they had to run to their wharves, and so were not suitable for Government requirements. In this their safety lay. The amount of the unaccounted-for gas was a little higher—158,000,000 c.ft., against 152,000,000 c.ft. He could not say what the cause of this little increase was. It was probably climatic to a large extent. He had been discussing the matter with their Engineer and General Manager (Mr. Stanley H. Jones); and he had his finger upon it.

The motion was unanimously carried.

DIVIDENDS.

Proposed by the CHAIRMAN, and seconded by Sir FREDERICK GREEN, a dividend was declared for the half year at the statutory rates per annum of £4 8s. p.ct. upon the 4 p.ct. stock, and 4 p.ct. upon the 3½ p.ct. stock, both less income-tax.

THE SECRETARY'S REMUNERATION.

The CHAIRMAN next proposed a resolution empowering the Directors to increase the remuneration of the Secretary, by an amount not exceeding £500 per annum, in such instalments as they may from time to time determine. There was, he said, an Act passed over seventy years ago called the Companies' Clauses Consolidation Act, 1845. That was in the early days of joint-stock enterprise; and there was a section in the Act which provided that the choice and removal of the Directors and Auditors, and the determination of the remuneration of the Directors, Auditors, Treasurer, and Secretary, should be exercised only at a general meeting of the Company. In those early days, it was probably thought that the Secretary was the chief executive officer, and that, by keeping the control of his salary in the shareholders' hands, the control of the concern would be kept in his hands also. Their chief executive officer to-day was the Engineer and General Manager; but Mr. Bradfield came a very good second. So it was they could not increase his salary without coming to the proprietors, and getting their authority. Mr. Bradfield joined the Company in 1901, when he became Accountant; and in the year 1911, when Mr. Ellis retired, and became their valued and valuable colleague on the Board, Mr. Bradfield was asked to also undertake the duties of Secretary. Since he joined the Company, the size and work of the undertaking had largely increased; and the duties of the Secretary had enormously grown. The Chairman proceeded to enlarge upon the work associated with the National Health Insurance, and the employees' benefit societies, which the Secretary took in hand. Then there was the work associated with the grant of badges, protection certificates, and so on. There was a return for income tax to be made for 1400 workpeople, which entailed an enormous amount of detail work, and a comprehension of the Income-Tax Acts. With all this heavy additional responsibility, Mr. Bradfield's duties were admirably performed in every way; and better done they could not be. The prompt manner in which the accounts were issued showed the ability, energy, and efficiency which was brought to bear upon his work. The amount for which the Directors now asked authority to increase his salary from time to time would with his present salary be much less than the former combined salary of the Secretary and Accountant.

The DEPUTY-CHAIRMAN, in seconding the motion, remarked that he, first as an officer and now as a Director, had had long acquaintance with Mr. Bradfield. He was a conspicuously competent Accountant; and he placed before the Directors and other friends the most complete analysis of the working of this and other undertakings of similar character which could possibly be prepared. To a Company like this, in such times, and among such rapids and rocks as they were steering through, there was an incomparable advantage in having these statistics at an early date, and in reliable and complete form. Mr. Bradfield was almost without rival as a Gas Accountant. Therefore he (Mr. Jones) submitted that to give their Secretary what the Directors were asking the power to give him from time to time was the plain duty of the proprietors.

Mr. WOOD made some inquiries on the subject, to which the CHAIRMAN replied. On the motion being put to the vote, only one hand was held up against it—that of Mr. Wood, who, however, indicated that he was not animated by any personal motive, but because, in his individual opinion, he considered their Secretary was sufficiently well recompensed. Among the remarks of the Chairman was that it would be the greatest calamity to the Company if they lost Mr. Bradfield.

VOTES OF THANKS.

Moved by Mr. GROVES, and seconded by Mr. WOOD, a hearty vote of thanks was passed to the Chairman and Directors for their efficient oversight of the Company's affairs.

The CHAIRMAN, in acknowledging the vote for his colleagues and

himself, observed that their seats on the Board were not so comfortable as they used to be, owing to war difficulties and trials. This was the case everywhere. They had to bear the extra burdens; but they were proud of the position of the Company, which they were very glad to serve.

Sir Frederick Green said he proposed before the proprietors separated to ask them to pass a vote of thanks to the staff—from the highest members down to the lowest grade of workers. Difficult as had been the time for the Board, it had been still more difficult for the staff; and the way they had shouldered the extra burden had been wonderful. The Directors were round the works the other day; and he was delighted to see the manner in which women and girls were working. They were taking a part which they could hardly believe possible before the war. They were turning out quite intricate pieces of mechanism, both for the Company and the Government, and doing it exceedingly well. As a shipowner, he knew that it was no use having a good ship without good officers; and the Company were extremely lucky in their officers. He had not the slightest doubt one of the reasons that the Company had so successfully weathered this difficult storm had been the fact that they had been so well managed and guided by Mr. Stanley Jones and Mr. Bradfield.

Mr. H. W. Gell seconded the motion, which was very cordially passed.

Mr. Stanley Jones, on behalf of the engineering staff, thanked the proprietors for their kind endorsement of the confidence the Directors had in the officers and men. These were, as had been said, most strenuous times; and, if he might say so, he was personally glad his principal colleague had got some additional recognition at that meeting, because, if he (Mr. Jones) were without him, he would be like a man without a leg and arm. What with the number of Government returns which they had to assimilate, in addition to the ordinary work, they hardly knew how to get through it all. With regard to the women workers, they were a gratifying surprise in the way they filled the gaps. Many of them were the wives and relatives of the men who had gone to the front; and this was the most satisfactory way of filling the gaps, as the women had an additional interest in the Company. The men who had been left behind shouldered the extra work cheerfully. He was happy to bear testimony to the good feeling and good will of the workmen generally towards the Company, the Directors, and the officers. They appreciated very much what was done for them in the way of war bonus; and the officers in their turn appreciated such recognition as had been that day given to Mr. Bradfield.

Mr. Bradfield replied on behalf of the clerical staff. He said there had been a great depletion of the staff generally, and especially of the clerical staff, for the reason that they were not technical officers, and therefore not exempt from war service. They had, in consequence, had to introduce a number of lady clerks, most of whom had turned out very successfully, and to some of them he must pay the special tribute that they had been of great value to him and to the other heads of the departments. He should also like to acknowledge the work done by the Committees of the various Benefit Societies, of which he was Secretary. Mr. Maddocks, one of his chief assistants, was Secretary of the profit-sharing system, and he should have credit for the administration of it. He would also like to refer here to the great service rendered to him by his chief accountancy assistant—Mr. Cowee. His services were invaluable. In conclusion, he said that he was very much impressed by, and he thanked the proprietors for, their generous recognition of his services. He could best describe his feelings by a little anecdote. A friend of his who recently obtained the D.S.O., before his return to the front said: "I am fearful lest I shall not live up to my reputation." He himself would have that anxiety in the future.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

The Annual Ordinary General Meeting was held last Saturday, at the Offices, No. 639, High Road, Tottenham—the Right Hon. Sir Daniel F. Goddard, M.P., in the chair.

The Secretary (Mr. E. J. K. Fussell) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

Difficulties, but a Note of Hopefulness.

The Chairman, in moving the adoption of the report and accounts, said in his experience of public speaking he had found an advantage in striking the right note at the beginning; and he should like to do that on this occasion. He thought the right note for him to strike was that of hopefulness. He could assure the proprietors that the Directors were very thankful they were able to come before them with a report that was a great deal better than they hoped for last February; and as a result—a result which he was sure they would approve—his speech would not be so long or so dolorous or explanatory as he was compelled to make it on the last occasion. Still he considered there was a great deal that was satisfactory in the report. He must ask the proprietors to remember that the Company were still hampered in the works by the conditions of war, and by the requirements and regulations of the Government. The difficulties were evidenced in the trouble of getting supplies, in the high prices they had to pay for everything, and in the shortage of man power to carry on the work, which they were obliged to make comply with the Government desires—in fact, if he were to describe the work of a gas undertaking to-day, he should say it was a constant struggle to overcome difficulties. But as a set-off, he should like to remind the proprietors that they had the satisfaction of knowing the enormously important part the gas industry was playing in the success of the country's armies in the tremendous conflict that was still going on. He did not think it was too much to say that already during this war the gas industry had saved this country by altering its plant in order to produce those elements which were required for high explosives, of which the country was very short at the beginning of the war, but with which it was now amply supplied—thanks to the gas industry. He thought he should not be putting it too high if he said the industry would again be the saviours of the country by arranging to produce more of the tar oils which were so absolutely necessary for the liquid fuel required by their all-important Navy, whether for defence or for attack. He thought he need not make more preliminary remarks, but proceed at once to the statement of accounts.

The Capital Account, and the New Four Million Section.

From the capital account, it would be seen they had expended on new buildings and plant this half year £27,769, all of which—with the exception of one comparatively small item of £1027, which was paid as the price of a piece of land, which was very necessary for the Company, adjoining the electric supply station—had been expended on the new gas section. He was very pleased indeed to be able to tell the proprietors, after a close inspection of the works that morning, that the new section was now almost completed—in fact, it was completed in many respects. That morning they had seen the new engines started working well which were to produce the motive power for carrying on the new section. More than this, they now knew absolutely that the new section would be quite ready for use in the coming winter; and so the Company would then have all the advantage they hitherto lacked, of being able to use it for the making and supply of gas. He thought perhaps the proprietors would realize what this meant when he told them that this new section was planned for producing 4 million cubic feet of gas per day. Within two months, during which the settings would be gradually heated-up and prepared for work, they would be able to get the section in operation, and quite ready for the winter supply. Under new mains and services in the capital account, there was rather a curious item. There was no expenditure, but a credit of £405, which was rather unusual. It was arrived at in this way. What had been spent on new mains was a very small amount, because they could not get mains, or labour to lay them. They had therefore spent only £158. But they had done a good deal of work, which they had been enabled to do out of their own stores without buying any fresh material, and which had been paid for by those for whom the work was executed. This had amounted to £563. Therefore, if they took the £158 which they had spent on mains, and deducted it from what they had received for work done, they obtained the credit balance of £405. On new meters they had expended £3224, which seemed rather large compared with the corresponding half year. This was really a matter of provision. They had to look forward. It was daily becoming more and more difficult to get even meters; and they had taken advantage of the opportunity to buy as many as they could, so as to be ready to meet requirements. The item of new stoves and fires was considerably less than it was a year ago—in fact it was only about one-fifth of what it was then. This was due to the fact that they could not obtain the stoves. They could place any quantity of stoves and fires if they could only get them. The prevailing conditions of war, occupying the manufacturing firms with other work, had prevented the supply coming forward, and there was really not sufficient to meet the demand. The capital account was over-expended by no less a sum than £145,385. Of course, this was largely accounted for by borrowing from the bank £160,000, which they had required to carry out all this new work. As soon as ever circumstances would allow the Board to place fresh capital, they would do so, and liquidate the loan from the bank. One satisfaction they could get out of this was that it showed the bankers had complete confidence in the future prosperity of the Company, or else they would not advance them so large a sum as they had done.

Coal and Oil Gas Making.

Turning to the revenue account, the quantity of coal used was close upon 9000 tons less than in the corresponding half of 1916. This would have meant in ordinary circumstances that they had saved £10,500. But they had not done so, because the rest of the coal—70,245 tons—had cost them £11,900 more; so that the result was that the expenditure for coal was £1400 more. Then if they had saved 9000 tons of coal, they had had to use something else to supply the gas. They had had to use more oil. The works were not capable of supplying all the coal gas wanted; and therefore they had to produce carburetted water gas in order to supplement it. They had used 84,364 gallons more oil, which had cost £3400. Then, in addition to this, the 756,709 gallons ordinarily used had cost more money, amounting to £19,640; so that the proprietors would see in the revenue account that oil had cost them £23,040 more than it did this time last year. Now they were told by the Ministry of Munitions that they could not let the Company have any more oil. This, of course, made rather a serious alteration in their methods of working, although personally he could not say he was very sorry for it, because it was really too expensive to make water gas and to carburet it with oil. It cost them 9d. per 1000 c.ft. more than coal gas to make carburetted water gas. Therefore, the sooner they could get rid of manufacturing it so much the better for the undertaking. Now that they saw the new coal-gas section coming into operation, they were very happy to be able to reduce the quantity of carburetted water gas. They had used more coke, at an increased cost, for the making of water gas. He thought it would be interesting to the proprietors to know this fact, that the net cost of the coal and oil used in the half year was three times as much as it was in the pre-war half year. This explained why they had had to raise the price of gas. As to the item of repairs and maintenance of works, there was very little to say. It sometimes went up, and sometimes went down, according to the work they had to do. Of the £19,895 which they were expending for repairs and maintenance, no less a sum than £1500 was spent in renewals in the No. 1 vertical retort house. Wages were higher than might be expected. This was partly due to the increased cost of living, and partly because they had had to use the Ponders End works, which were very extravagant in regard to labour. He was thankful to know that, if they had good fortune with their new plant, they would not have to use the Ponders End works during next winter.

Other Items in Revenue Expenditure.

Coming to the expenditure on distribution, the difference between this and last year was very trifling. Then there was an item "Renewals

Fund," to which they were appropriating £4000. During the last two years, they had been working their plant at the highest possible pressure; and they must foresee that the result of this would be expensive repairs and renewals. In addition, there were the works at Ponders End, which were not profitable to work: so that they must be prepared to put them into good working order. Therefore they thought it a wise and prudent policy to appropriate £4000 from the revenue account for the purpose of renewals. As to the co-partnership, he was very sorry about this. They were only expending for this £469, against £2337. The reason for this was that the co-partnership proposition was based on a sliding-scale, just the same as the dividend proposition. As the price of gas went up, the bonus went down; and as their price had now gone up to the present figure, they could not pay any bonus. The £469 was the bonus for the first three months of the year, and for no time after that. He was sorry for this; but it could not be helped. It was the basis upon which they set out with co-partnership; and they could not alter the position. The pensions fund and superannuations had increased. The item included £387 which the Company did not pay before. The basis on which the pension fund was arranged was that the men paid one-third of the subscription out of their wages week by week, two-thirds were contributed out of their co-partnership bonus, and then the Company added a similar amount—that was to say, doubled what the workmen had paid. As there was no bonus now, there would be no money from it to pay to the pension fund; and it looked on the face of it as if the pension fund would have to be dropped. The Directors, however, had taken this very carefully into consideration; and it did not seem to them just that their men, who had worked long and well in the interests of the Company, should be made to sacrifice their pension allowances because the country happened to be at war. So what the Directors had decided to do was, until they could restore the bonus to its previous position, to pay the two-thirds out of the profits of the Company which should be paid by the workmen themselves. He felt sure the proprietors would agree that this was good policy. He had the pleasure of meeting the men at the works some time ago, and explained this to them; and they received the decision of the Board with great pleasure and gratification, and were quite satisfied with it. Then there were the special war items. They had naturally increased, because the cost of living had increased. One further little item was aircraft insurance. Some people did not think they ought to have expended money on aircraft insurance. Since they did so, they had had four bombs dropped on their premises, which might have done a great deal of harm; and so it was not a bad thing to be insured against such a risk.

THE REVENUE.

The income from the sales of gas to private consumers had increased by nearly £43,000. This was largely due to the advance in price, which was now 3s. 4d. per 1000 c.ft. This was a very high price compared with that at which they had been selling gas. But it was not a higher price than the great Gas Light and Coke Campany were now charging; so that there was nothing to repine about over that. In 1916, the price was 2s. 3d.; so that the 3s. 4d. accounted a good deal for the rise in the income from the sale of gas. He could not say more than that they simply could not help this. They were obliged to make both ends meet. Public lighting showed a reduction of £4307. They must put this down to the Huns; it was purely and simply the fault of the war. As to residuals. Having carbonized 9000 tons less coal, they had some 4500 tons less coke for sale. Fortunately, as the price of coal went up, so did the price of coke; and they had realized a higher value for it—indeed, it almost equalized the loss. They were pressing the sale of coke as much as they could among the people in the neighbourhood. The great difficulty they had now to contend against was transport. They could not get horses or carts nowadays, nor could they get men to drive them. The motors, too, were restricted in petrol; and the result was that it was very difficult to get coke transported to those who wanted it. Tar also suffered because of the less quantity of coal carbonized; but it realized a higher value, and showed a small increased profit. Sulphate of ammonia was also less, because of the smaller quantity of coal carbonized. Unfortunately, they had not a higher price. The Government restricted the price at which they could sell the sulphate for agricultural purposes; and they had not exported any. It had all been used for home agriculture; and if they got less profit, they could only console themselves by the thought that they had been very patriotic.

THE FINANCIAL RESULT.

The result of the gas revenue account was that the balance to profit and loss account—£31,239—was £648 more, after charging £4000 for renewals fund, which was not a bad state of things. The electricity station, which had only a small business yet, was constantly improving. The profit and loss net balance, after paying all charges, was £19,217; and the amount required to pay the full statutory dividend at the present price of gas was £14,251, as they were able to carry forward £4466, which compared with the £2185 carried forward a year ago, and compared more favourably still with the £286 which they carried forward last January.

IMPROVED PRESSURE AND LOWER UNACCOUNTED-FOR GAS.

He had one little piece of good news for the housewives of the district. The Directors and their Engineer had been looking for, and longing for, a new apparatus which would help them to increase the pressure of gas, from a deficiency of which consumers had suffered. He was happy to say that the apparatus had now been delivered; and the Deputy-Chairman and himself saw it at work that morning. After it had been in operation a little time to get thoroughly into its bearings, he had no doubt it would be successful in immensely improving the pressure in the distriet, especially during the Sunday dinner cooking hours. There had also been an improvement in the unaccounted-for gas, which was now a little over 5 p.ct.—a good figure for a Company of this size and a district of this character.

THE END OF A LONG TRAIL OF DEFICITS.

His task was done in explaining the accounts. He began with the key-word of hopefulness; and he was not going to end his remarks in a minor key. He had been giving the proprietors common-place elements of what he might call the bread of their existence. Now before he finished, he was going to put a little jam upon the bread. For seven consecutive half years, the net profit had fallen short of their requirements for dividends. From Dec., 1913, to Dec., 1916, this shortage amounted to £67,070. He was happy to say that now this long trail of deficits had ended; and this half year they were able to show a surplus of £3784. If they had had all these deficits, whence had they got the monev with which they paid the dividend? They had drawn it from their reserves; and their accumulated reserves, which at June, 1914, stood at £100,414, at Dec., 1916, had been reduced to £61,520—39 p.ct. of their savings in reserve had gone. But the tide had now turned, and the reserves had recovered to £70,339. Looking at these facts and figures, he could with confidence say to the proprietors that they might look forward to the future with hopefulness.

Mr. Henry Bailey seconded the motion.

Proprietors' Views and Inquiries.

Mr. H. Michel said he ventured to think that on this occasion, when the Directors were facing not only the proprietors, but the consumers of gas in a very large and populous district, they should call attention to one feature in the affairs, not only of this Company, but of all gas companies in general, which he did not think was entirely appreciated either by the stockholders or the consumers—that was, that this vast industry, with all its beneficial effects to the community, was carried on at a very small profit. Here the Company had a considerable capital; but the undertaking was carried on with an interest on the capital of less than 5 p.ct. Therefore, the consumer, if he felt he was paying a high price for gas, had the consolation of knowing that he was getting that gas at the lowest possible price at which it could be manufactured. He thought this fact was very important, and should be impressed upon the consumers. Of course, the small rate of remuneration was reflected in the price of gas stocks on the London Stock Exchange. Speaking from memory, he believed that there were, out of some 36 or 38 gas companies whose stocks were quoted, only some six whose stocks were to-day standing at a premium.* If they realized this fact, too, the consumers would further appreciate that they were being served at the smallest practicable cost. He asked the Chairman whether he was in the happy position of a Director of two gas companies whom he (Mr. Michel) recently met, who informed him that they had obtained a reduction of 2s. 6d. per ton in the cost of their freight for coals. If this Company had the same experience, it would make a difference to them next half year of about £8000. He urged the great importance of cultivating the use of electricity for power purposes. They had an extensive industrial area here; and it was not nearly covered yet. He remembered their late Chairman (Sir Corbet Woodall) once said he believed there was a large future for both gas and electricity in this country. In conclusion, he remarked that he was glad there was a return, at all events, to a comparative prosperity. The decrease all at once of 2 p.ct. in the dividend on the "A" stock, especially with an income-tax of 5s. in the pound, made some of them look very serious indeed; but they knew it was due to circumstances beyond human control.

Mr. Weld said he understood the Chairman to say the reserve fund had now been made up to £70,000. He failed to see that this was so.

Mr. John Randall observed that he gathered from the Chairman's remarks that the whole of the co-partnership bonus had now gone, in consequence of the increase in the price of gas. He was glad the Directors had taken the step of doing something towards meeting the loss to the men by making an addition to the pension fund. He was a firm believer in co-partnership; and he was wondering whether anything could be done to meet the loss the co-partners had sustained through unavoidable conditions. They heard from the Chairman that the price of gas had increased 1s. 1d. in the year. Such a thing as that could not have been within the dreams of possibility to those who drew up the co-partnership scheme. For many years, they had been accustomed to a slow rise in the amount of dividend, and the co-partners had received a better and better return. This had been swept out of existence very suddenly through circumstances that could not have been foreseen. He was wondering whether the Directors could not take this matter into consideration, and give some kind of special bonus to be distributed on the same lines as the £469 that appeared in the revenue account on this occasion. It was true the Directors had been very liberal in the allowances they had made under the heads of payments to dependants, and war bonus on wages, which meant the big sum of £8500. But he should like them, between now and the next half-yearly meeting, to take into consideration the question of whether a small bonus could not be granted to the co-partners, to show the sympathy of the proprietors with the system, and their desire to see it soon in active existence again.

Mr. James Moore said that, while believing in co-partnership, they saw that the wages of the men had been raised by a war bonus, allowances were made to their dependants, and they had a chance of a pension; and he did not think in present circumstances the money of the proprietors should be given away in the manner suggested by the last speaker. Co-partnership would come back to its own again on its own basis.

Mr. A. W. Reid asked whether the Directors had considered the question of the supply of gas for driving motor vehicles, in place of petrol.

The Chairman said he was afraid he could not hold out any hope to Mr. Michel that there would be a reduction in the cost of coal. The Directors had not found it yet. There was only one point in regard to that. The Government were anxious they should turn out as much tar oils as they could, and so might be willing to give some facilities in regard to the supply of coal. Regarding the supply of electricity for motive power purposes, he realized the importance of this. But he

* Probably Mr. Michel has overlooked the fact that these are unconverted stocks, and that the others are those that have been converted to a lower dividend basis.—Ed., G.J.

reminded the proprietors that up to the present time the Company had only a small area in which to distribute electricity—that was Wood Green; so they had not such a large opportunity of development in that respect as they would like. As to Mr. Weld's inquiry concerning the £70,000 in the reserve "fund," he did not think he said "fund," but "in reserves." If they took the £4466 profit carried forward, the reserve fund of £31,180, the insurance fund of £20,339, and the renewal fund of £14,353, they had the £70,000 which constituted their reserves. As to the co-partnership scheme, it was drawn up with a fixed price of gas to yield a certain bonus to the workmen. They had been obliged to live-up to the agreement. It might be that they had not fixed the right basis for the co-partnership, just as it might be with regard to the sliding-scale for dividends. These things might have to be altered, when they got to know all they could say about them. Now they were at war; and it was the abnormal circumstances that had thrown them into the present position. When the price of gas returned to its normal state, the bonus would again go up, and there would be little difficulty about it. As to the sale of gas for motive power for road vehicles, they could not get the cylinders for compressed gas; and they could not get the steel with which to make them. Then there was also the plant for compressing the gas. The only means was to use flexible gasholders. This was being done considerably; but in every direction they were hampered by the difficulty of obtaining materials.

The motion was unanimously carried.

Dividends.

The Deputy-Chairman (Mr. Henry Woodall) moved the declaration of dividends at the rates per annum of 5 p.ct. on the preference stock, 5½ p.ct. on the "A" consolidated stock, and 4 p.ct. on the "B" consolidated stock. He remarked that this was a great improvement upon last half year; and, besides, they were increasing the carry-forward, and placing £4000 to renewal fund. It was essential to keep the renewals fund in the highest possible state in view of the present difficulties with, and costs of, materials and labour. One other point. While regretting very much the necessity of raising the price of gas to a point that wiped out the co-partnership bonus, they had the happiness of knowing that they were adding to the pensions fund, payments to dependants, and war bonus, £2854 more than in the corresponding half of 1916.

Mr. H. D. Ellis, in seconding, congratulated the proprietors upon the improved position and prospects of the Company, of which the enlarged dividend was a solid and substantial evidence.

The motion was adopted.

Re-elections.

Proposed by the Chairman, and seconded by Mr. Weld, Mr. John Walker Ford was re-elected to his seat at the Board, as was also Mr. H. D. Ellis, on the motion of the Chairman, seconded by Mr. James Biggs.

The retiring Auditor (Mr. John Eve) was re-appointed on the motion of Mr. J. W. Lynch, seconded by Mr. Reid.

A Vote of Thanks.

Moved by Mr. Michel, and seconded by Mr. J. B. Sherwin, a hearty vote of thanks was passed to the Chairman, Directors, Auditors, officers and their staffs, and the workmen. The men at the front also had sympathetic reference.

The Chairman, in his acknowledgment on behalf of the Board, mentioned that last half year the Company lost thirteen more of their men, who had made the extreme sacrifice of their lives for their country; and there were still serving some 381 of the Company's men.

Mr. A. E. Broadberry (Chief Engineer and General Manager), in the course of his reply on behalf of his staff, men, and himself, remarked that, with the new section coming into operation, they felt that the worst of their difficulties had been passed, and that for the future they would be able to carry on much more easily than before. Their difficulties, of course, had been considerably greater owing to so many of their regular men being away in the army. But having got through what they believed was the worst of the time, he thought that, until the finish of the war, they would now be able to carry on much more comfortably.

Mr. Fussell also replied, on behalf of his department, mentioning among other things that he had received every assistance from those who had come to take the place of those who had gone to the front. He was fortunate in having as a brother officer Mr. Broadberry. Between them and all round there was loyal co-operation.

THE WANDSWORTH RESULTS.

It will be the pleasure of the Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company (Mr. H. E. Jones) to inform the proprietors next Tuesday that the sale of gas for last half year shows an increase of 9·7 p.ct. over the same period of 1916. The revenue account, however, presents a profit of only £22,465; and after providing for the interest on debenture bonds and stocks, and on deposits and loans, there remains to the credit of the profit and loss (net revenue) account an amount of £15,448. The dividends recommended are the statutory ones, at the following rates per annum: On the Wandsworth "A" stock, £7 5s.; on the Wandsworth "B" stock, £5 15s.; on the Wandsworth "C" stock, £5 1s. 6d.; on the Wimbledon stock, £5 2s. 6d.; on the Epsom stock, £5 15s.; and on the new ordinary stock, £5 1s. 6d. p.ct. The decreases in the rates of dividends are due to the increase in the price of gas in accordance with the sliding-scale; but they will require a contribution from the reserve fund of £10,862. The Directors regret that they have had to increase the price of gas by 6d. per 1000 c.ft. from Ladyday, 1917. This makes a total advance over the pre-war period of 9d. per 1000 c.ft. upon the very low price then charged. This increase has become necessary owing to the enormous addition to the cost of coal and freightage, to the heavy cost of allowances and war food bonus, and the advance on all materials and wages.

The accounts show that coal (99,571 tons were carbonized) cost £136,778; and oil, coke, and water, £27,231. The quantity of oil used was 528,885 gallons. The aggregate manufacturing costs were £204,742, out of a total expenditure on revenue account of £272,186. The quantity of gas made was 1,517,846,000 c.ft., and sold 1,417,013,000 c.ft. The receipts for gas amounted to £178,075. Rental of meters, stoves, &c., contributed £29,972; and residual products £86,562. The total income was £294,651; and the balance to profit and loss account, £22,465.

EDINBURGH GAS EMPLOYEE REFUSED A CLEARANCE CERTIFICATE.

At the Edinburgh and District Munitions Tribunal on Tuesday last a man employed by the Edinburgh and Leith Gas Commissioners as a rigger's labourer applied for a clearance certificate on the ground that he received insufficient pay, and that he wanted to go to munition work, where he would have better conditions and more money.

The Commissioners' Engineer and Manager (Mr. Alexander Masterton) stated that the man was employed in painting and patching gasholders at the Granton Gas-Works. It was difficult to find men who were able to do work at a high altitude—hence the Commissioners' opposition to the application. The man entered the service of the Commissioners in February last; and it was strange that he should come forward now and ask for a certificate, seeing that Sir Richard Lodge had recently granted, as from July 1, an additional war bonus of 5s. per week. The man's pay (including 11s. bonus) was 38s. 7½d. for a 51-hour week. The Commissioners' establishment was a certified one; and they were doing important Government work.

The applicant (a discharged soldier) said he was not so strong as he used to be, and found the high climbing too much for him.

Sir Andrew Fraser, who presided, said that the Court held that, in the circumstances, the withholding of the certificate was not unreasonable. The certificate was accordingly refused.

COAL AND COKE RATIONS.

The Coal Controller's Proposals.

Last week, Mr. Guy Calthrop, the Controller of Mines, issued his instructions as to the use of coal and coke during the ensuing winter season; and it was prefaced by a full "Explanatory Memorandum," which points out that the Order does not extend to coal used for industrial purposes—such as the production of gas, or the generation of electricity, or the raising of steam—except where such industrial purposes are subsidiary to the use of coal for household or domestic purposes, as may be the case with large hotels, blocks of residential flats, theatres, churches and chapels, clubs, meeting rooms, baths, public buildings and institutions, &c., to all of which the Order extends. It also extends to industrial purposes, where the industry, trade, or business is carried on in a dwelling house or in a building used in connection therewith.

The routine or machinery of the scheme, so far as regards the consumer, is of the simplest character, and follows as closely as possible the ordinary routine or machinery of sale and purchase. No cards or tickets are required for the purchase of coal; but the execution of the scheme is left in the hands of the coal merchants and retailers so as to occasion as little disturbance as possible to the ordinary channels of trade. To safeguard the interests of the whole body of consumers if there should be a shortage, the control of the detail operation of the scheme, so far as regards the consumer, is vested in the local authorities, acting through a specific representative, subject to the approval and inspection of the Controller or his representatives. Requisite powers are conferred on local authorities for this purpose.

The Order requires that an ordinary consumer of coal and coke must not (1) deal with more than one coal merchant, except for the purchase of coke from a gas company; (2) consume more coal than is his rightful allowance; (3) obtain coal in quantities in excess of 2 cwt. in one week (or in the case of coke 3 cwt.), except under a requisition duly approved; (4) store more coal at any time than will last him a year if he burns no more than his allowance; and (5) waste coal. The procedure under the Order in so far as it affects consumers is made as easy as possible. In the first place, a consumer requiring no more than 2 cwt. of coal or 3 cwt. of coke in the week can purchase these quantities weekly without any formality of any kind. Next, a householder requiring no more than the weekly or monthly allowance of coal provided by the scale set out has only to fill up a simple requisition form, to be obtained of his usual coal merchant, and to leave it with him again when - led up. He may then order his coal as he requires it, without any further formality, except that his orders must be in writing. Only consumers requiring special allowances of coal, or calling for special assessment, will be troubled with inquiries in the ordinary course.

The final clauses of the Order set forth the duties of the local coal overseers, who will be appointed by the local authority under the Order, and of the coal merchants' supervisors, with whom they will co-operate, who are nominated by the merchants in the distribution areas fixed by the Controller.

Melton Mowbray Gas Company.—The annual meeting was held last Friday week, when the balance-sheet presented shewed that slightly less business had been done during the year. The sales of gas had gone down—principally owing to none of the public lamps being lighted during the year. The profit and loss account shewed a balance of £4450. A dividend of 6¼ p.ct. was declared.

AUSTRALIAN GAS-WORKERS RESTLESS.

A Stop-Work Meeting Called.

The "Melbourne Argus" for June 4 reported that a stop-work meeting (which amounts to a one-day strike) was to be held in Melbourne the following Thursday morning by the members of the Federated Gas-Workers' Union. A decision to this effect was arrived at by the members of the Union at a meeting held in the Trades Hall the previous Saturday night.

An official of the Union stated that at this meeting great dissatisfaction was expressed at the action of several gas companies in Victoria which, it was asserted, had refrained from giving effect to the award delivered by Mr. Justice Higgins last April so far as its retrospective conditions were concerned. In the award the increased rates were made retrospective from November, 1915. The Victorian companies concerned were those at Brighton, Williamstown, Footscray, Box Hill, Bendigo, and Ballarat. The Metropolitan Gas Company of Melbourne was joined as one of the respondents when the case was before the Court; but the retrospective conditions did not apply to it, as it had granted increases under an agreement in 1915. The other companies had made promises that the back-money would be forthcoming. A motion was submitted at the meeting that an immediate cessation of work take place by the staffs of the companies concerned; but after discussion it was resolved that the meeting should be adjourned until the Thursday following, when further consideration would be given to the grievances of the men.

As the motion was agreed to, the employees of the Melbourne Gas Company were included; so that they could take part in the meeting. This meant, our contemporary pointed out, that the manufacture of gas in Melbourne, and probably in Bendigo and Ballarat, would be entirely suspended. Should the stoppage be confined to only one day the public and industries that rely on gas for domestic and motive power would not be seriously inconvenienced. A shortage of gas, however, would follow a suspension of work for a few days. About 800 men were concerned.

Referring to the matter, Mr. P. C. Holmes Hunt, who represented most of the respondents in the recent case before the Arbitration Court, said that the trouble had reference to an award made by Mr. Justice Higgins on April 4, under which rates of wages were made retrospective from November, 1915, against all the respondents before the Court excepting the Melbourne Gas Company. The retrospective rates were based on a log served on the various companies in September, 1915; but this dispute was never heard by the Court—a new log being served in November, 1916, on which the Court made its award in April last. The compilation and checking of these new rates, and in many instances the new gradations of pay over a period of twelve months, had necessarily taken considerable time, and in some cases the work had not yet been completed. Moreover, it had been found that the award made covered many items which were not demanded in 1915, and therefore could not have been in dispute before Dec. 20 last—the date on which the Court got cognisance of the dispute. Consequently, it was necessary for the award of the Court to be corrected before being signed by the Judge; and as soon as this was done, the companies would pay the rates. The difficulty had been pointed out to the Union, and also to the Court; and the representatives of the companies had been asked by the Industrial Registrar to attend his office in regard to the position. It was understood the Union representatives would also be present. Despite the knowledge, therefore, of the difficulty facing the companies, and the fact that the Court had been asked to deal with the matter, the Union apparently intended to take the matter into its own hands, and announced its intention to take steps calculated to seriously interfere with the supply to the public of such an important commodity as gas. The companies affected by the retrospective operations of the award, in addition to Ballarat, Bendigo, Brighton, Williamstown, Footscray, and Box Hill, are Hobart, Launceston, and Adelaide.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 20.

The tar products market for the past week has been steady. With regard to pitch, the price is firm at about 45s. per ton net in bulk at maker's works for export. There are considerable inquiries from the Continent; and it may be mentioned that some shipments are being continued throughout the summer months. Ordinary London creosote, although under Government control like other creosotes, remains firm at about 4¼d. to 4⅜d. per gallon net for sale under licence. Solvent naphtha is unaltered at about 2s. 2d. to 2s. 3d. net per gallon in bulk *ex* maker's works.

Sulphate of ammonia is in steady request for forward delivery for home agricultural purposes, on the basis of the official prices.

Tar Products in the Provinces.

Aug. 20.

There is little fresh to report concerning the markets for tar products with the exception of pitch, which is again firmer. Better prices have been paid, especially in London. Solvent naphtha is also firmer.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10¼d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Continued improvement is to be noted in the market for pitch; and the remunerative prices now obtainable in London for shipment have been reflected to a slight extent in the Provinces, where an upward tendency is to be noticed. Some idea of the improved conditions may be gauged from the Clyde quotation of 19s. to 20s., whereas it was not so long ago that a seller—if he wished to sell—had to accept 15s. 6d. to 16s. 6d. Quotations for next season's shipment remain at about 45s. London. The outlook remains good, and a little more concerted action on the part of producers would probably bring about better prices for a portion of the business for East Coast shipment. Naphthalenes show no change. The system of licences is the great drawback to business, and no relief in this respect can be expected until the war is over, or, at any rate, nearer its finish than it is at present. Licences being required for creosote also, trade, apart from Government requirements, is at a standstill. A few licences have been issued, but these expire in about six weeks' time. Practically the whole of the output is being used for national purposes. Naphthas remain firm; 2s. being asked for solvent kinds, while heavy is unchanged at 1s. 5d. Aniline oil (pure) exhibits an easier tendency, and cresylic acid is off colour. This is somewhat extraordinary, because, at this season of the year, and in the absence of the other chief ingredients of disinfectants, there should be a good market for it.

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 25s., Midlands 23s., North 23s. 6d. per ton, *ex* works.

Pitch: East Coast, 17s. to 18s. f.o.b.; West Coast—Liverpool and Manchester 17s. 6d. to 18s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190 % 1s. 4d. to 1s. 5d.; North 1s. 2d. to 1s. 3d. per gallon; 90-160 % naked London 2s. 2d. to 2s. 3d.; North 1s. 8d. to 1s. 9d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8½d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3⅞d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1⅞d. to 2¼d.

Cresylic Acid: 95 %, 2s. 5d. and 2s. 6d.; 97-99 %, 2s. 8d.—2s. 9d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton.

Sulphate of Ammonia.

Home trade orders are still plentiful, not only at the low price up to September, but at the higher quotations for the rest of the year and for the spring. It is by this time quite clear that the Government intend to press an increased use of fertilizers generally on the home agriculturalist; and a recent statement by Mr. Prothero suggested that the Government may be able to increase five times the amount of sulphate for the harvest of next year. The farmer is already using more than ever before, and is being very well treated under the new Corn Production Bill. The sulphate manufacturer, however, has a feeling that the trade is not being fairly treated, and that a definite fixing of values should have been included in the scope of the Bill. As it is, Government control is practically certain during the currency of the Act, and any attempt to raise the price of sulphate will cause the farmers to quote the conditions prevailing prior to the fixing of prices for grain, &c., among which is the present official limit for sulphate.

This feeling, and the confusing regulations regarding payment and delivery, are retarding business, in spite of the fact that manufacturers will be compelled, more and more as time goes by, to look to the home trade for the largest part of their business. A few licences have been issued for limited quantities at about £22 10s. per ton f.a.s.; but it is evident that export trade will be kept within narrow limits during the war. Several of our late chief foreign customers are already becoming producers of sulphate, and after the war, so far from buying from this country, may, and probably will, become our competitors in their adjacent markets. American competition will also have to be met. The United States output for 1916 is returned at 294,800 tons, and the consumption at roughly 315,000 tons. A further increase in home production is practically certain during the current year, which will doubtless more than make good the deficiency in supply; and as less than 40 p.ct. of metallurgical coke was produced in bye-product ovens last year, America looks like having an exportable balance in the near future for which there will be a ready market in the Far East. France, however, will be a large buyer of sulphate after the war, and our manufacturers might do worse than make some efforts to cultivate her trade by the inauguration of a well-considered propaganda and educational scheme.

The Salford Town Council have confirmed a resolution of the Gas Committee to make a grant of £100 per annum to the Red Cross Hospitals in the borough, in lieu of supplying gas free of charge, as on previous occasions.

Chemical Engineering and Wilton's Patent Furnace Company, Ltd., was registered as a limited liability company on the 13th inst., with a capital of £20,000 in £1 shares, to take over the old-established business of the Chemical Engineering Company at Hendon. The Chemical Engineering Corporation, Ltd., was registered the following day, with a capital of £5000 in 20,000 "Management" shares of 1s. each and £4000 ordinary shares of £1 each.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade still shows a good deal of irregularity, mainly due to the scarcity of ready steamers; the demand being on the whole a little better. In steam coals, some inquiry is shown for Norwegian buyers, and the market is rather firmer. Best Northumbrian steam are 30s. per ton f.o.b.; for second-class descriptions, the current quotation is from 25s. 6d.; and steam smalls are in full supply at from 18s. 6d. to 20s. In the gas coal trade, the consumption increases, more especially for home needs, and also to add to the stocks in hand. Best Durham gas coals are quoted at 25s. per ton f.o.b.; second-class qualities are about 23s. 6d.; and "Wear Specials" are steady at from 26s. 6d. to 29s. 6d. The rate of freight on gas coals is from 15s. to 16s., Tyne to London, according to size of steamer. Some shipowners complain of the very heavy insurance charges, which help to stiffen these freights and make the gas coal dearer when sea borne. There is little new as to the gas-coal contracts. Coke is steady; the home use being heavier, though exports are limited. Good gas coke is from 30s. to 32s. per ton f.o.b.

Croydon Gas Company.

At next Friday's meeting of the proprietors (the 141st ordinary half-yearly general meeting) the Directors will report that the sale of gas last half year exceeded that of the corresponding period of 1916 by 9·13 p.ct. The number of consumers increased in the half year by 158, and that of stoves on hire by 186, while 565 stoves were sold to consumers—representing a total increase for the half year of 751. The tar dehydration plant mentioned in the last report has now been brought into operation. It is mentioned that there has been established in connection with the co-partnership scheme a "Contributory Pension Fund," guaranteed by the Company. Having regard to the effect on the co-partnership bonus of the abnormal conditions which prevail, they have also amplified the co-partnership scheme to the extent of providing that there shall be a minimum bonus of 4 p.ct. Part of the contributions of co-partners to the pension fund is charged against this bonus—the remainder being paid by co-partners by way of deduction from wages. After providing for all fixed charges, there remains available for division a balance of £35,547, and the Directors recommend that dividends be declared at rates of 14½, 11½, 5, and 10 p.ct. per annum on the various classes of stock. These will absorb the sum of £24,103, leaving a balance of £11,444 to be carried forward.

Burnley Corporation Accounts.

The Burnley Corporation's annual statement of accounts gives the result of the working of the Gas Department during the year ended March 31. On the expenditure side appear the following amounts: Coal, £42,235; cannel, £2012; coal-storing and unloading, £760; gas oil, £6912; coke used for water-gas, £3078; wages of stokers, £6691; repairs and maintenance of works and plant, £7476. Other expenses brought the manufacture of gas to £70,114. The distribution of gas cost £5194; public lamps, £1110; rents, rates, and taxes, £5318; management expenses, £5012. The total working expenses were £86,794. The income from the sale of gas, less discounts and allowances, was £88,132. With public lighting and other contracts the total income for gas sales was £90,336. Rentals brought in £1169, residual products, £26,955. Altogether the income from all sources was £118,545. Against an estimate of £3440, the department contributed to the rates £2194. The income fell £1246 below the estimate. The reserve and depreciation fund stands at £11,049. The capital outlay during the year was only £151 18s. 4d. The allowance to employees who have joined the forces was £1314. The repayment of loans during the year was £11,264. The tax on profits amounted to £6178. The cost of erecting the tar distillation plant was £3612.

Appeal for a Stoker.—The Rugeley Gas Company have appealed to the Mid-Staffordshire Appeal Tribunal for a gas stoker, aged 34, Class A, on the ground that they were being urged to increase the output of gas, and that the man was the only able-bodied employee they had left. The Military Representative urged that exemption should be granted by the Ministry of Munitions and not by the Tribunal, and the man was given one month to enable the Company to obtain the necessary certificate.

Increased Wages at Southport.—The Southport Town Council last Tuesday confirmed the decision of the Gas Committee to increase the wages of workmen as follows: Foremen, 46s. per week; engine, machine, telpher, and vertical-retort men, 5s. 10d. per shift; stokers and carburetted water gas men, 5s. 8d. per shift—exclusive of war bonus, which is equal to 8s. per week. The men applied for an all-round increase of 15s.; while the present increase (with the war bonus) is equal to 10s. 6d. per week.

High-Pressure Gas Scheme for Stafford.—Owing to the reduced pressure of gas caused by the increased consumption during the past ten years, the Stafford Town Council have, on the recommendation of the Gas Engineer, decided to lay down high-pressure mains, and to make application to the Local Government Board for sanction to the borrowing of £3000 to cover the cost of the necessary machinery. The Gas Committee have been instructed to inform the Local Government Board, in making the application, that they were anxious not to incur any avoidable expense during the present trying times, but they were convinced that the proposal of the Engineer should be entertained, not only in the interests of the general body of consumers, but for the purposes of keeping up an adequate supply to the various works, and, in addition, to enable a full utilization of the output of the vertical retorts, which it is hoped will be in operation in time for the coming winter. Among the tenders that have been accepted in connection with the scheme are those of the Bryan-Donkin Company, for compressors and governors, £738; and the Gas Distribution Company, for supplying, laying, welding, and testing mains, £1387.

Peterborough Gas Company.

Alderman D. H. Redhead presided last Tuesday at the half-yearly meeting of this Company, when the Directors reported that, after paying dividends and other charges, there remained a balance at June 30 of £10,896, from which they recommended dividends of 5 p.ct. on the preference "A" shares and 8 p.ct. on the consolidated ordinary stock. This would absorb £2972, and leave a balance of £7923. The Chairman, in moving the adoption of the report, which was agreed to, explained that the decrease in the consumption of gas has been 3,339,000 c.ft., caused by inability to give full pressure during the winter. They had been unable to maintain the pressure because the staff had been depleted to the extent of one-half. Munition works depended upon them for gas, and had to be first considered. The Government were pressing them to make more gas and more tar; but they could make neither tar nor gas unless they had the men. For twelve months they had been asking for machinery which would help them; but they were not permitted to have it—the Government declaring there was other work which was more essential. They had therefore had to get on the best way they could; and one thing which the Directors rather boasted of was that, despite all the difficulties, they had neither raised the price of gas nor lowered the dividend. This could be attributed to their foresight in accumulating reserve to meet such times as they had been passing through. They had been paying about 4s. a ton more for coal than last year.

Bournemouth Gas and Water Company.

Mr. G. Crispe Whiteley is expected to occupy the chair at next Friday's meeting of this Company. The Directors report that, for the half year to June 30, the revenue receipts again showed a substantial increase over the corresponding period of 1916; but the increase was more than absorbed by the increased cost of coal, wages, and other materials. The Directors mention that in May the s.s. "Corbet Woodall," which was built for the Company's service, was lost; and as a consequence, a further increase in the cost of coal is anticipated. The increased revenue charges have rendered necessary a further addition to the price of gas as from Midsummer, of 6d. per 1000 c.ft., with the result that for the ensuing year the statutory dividend on the Company's original shares will, under the provisions of the sliding-scale, be again reduced. A further effect of this increase in price is that as from June 30 the bonus under the Company's co-partnership scheme as now in force ceased. The Directors feel that this arises from abnormal circumstances; and that, in justice to the co-partners whose loyal services to the Company they much appreciate, an alteration should now be made. They therefore recommend that a minimum bonus of 4 p.ct. should be granted. The Directors also recommend the establishment as from Sept. 1 of a co-partners' pension fund, to which both the co-partners and the Company will contribute; and at the meeting the sanction of the proprietors will be asked to the necessary alteration in the rules governing the co-partnership profit-sharing scheme, and to the establishment of a co-partners' pension fund. After writing off £2939 for works superseded, the Directors recommend the payment of the statutory dividends amounting to £20,358 and leaving £21,135 to be carried forward.

Tunbridge Wells Gas Company.

The 107th half-yearly meeting of the Company was held last Wednesday. Alderman W. H. Delves, J.P., the Chairman of Directors, who presided, said they would not anticipate a rosy account of the prospects of the Company, in view of the continuance of the war. The cost of coal during the past half year had shown the high average increase of 4s. 9d. per ton—the total cost being £7000 above that of the previous half year. The 2d. per 1000 c.ft. increase in price only came into effect from Ladyday; and the full benefit of it would be felt during the next six months, which would consequently be more favourable. The price of carbonizing materials had greatly increased; while the price of residuals remained practically the same. The price now charged for gas compared favourably with that of other companies, said the Chairman, who proceeded to remind shareholders that it was as much to their interests as the consumers' to keep down the price, as an increase of 1d. per 1000 c.ft. meant a loss of dividend of 5s. per cent. The Chairman complained of the indecision of the Government with regard to gas matters, and pointed out that for sulphate of ammonia they were realizing 17s. 6d. per ton less, although the cost was higher, while there was no corresponding proposition brought forward to make up for that. For sulphuric acid, for instance, they were paying double the pre-war price. The sale of gas during last half year had increased by 12 p.ct. as compared with the same period last year; and if the advice of the Government to burn more gas were taken, there would be a further increase. At the next annual meeting a proposal to discontinue the half-yearly meetings, but continue to pay interim dividends, would be considered, as the half-yearly meeting was really unnecessary in view of the fact that the accounts were made up annually. In conclusion, the Chairman alluded to the fact that Mr. L. J. Langford had succeeded Mr. Alex. Dougall as Engineer. The Chairman subsequently moved the declaration of the interim dividend for the half year to June 30 at the following rates per annum: 11¾ p.ct. on £20,000 of consolidated "A" stock, 9¼ p.ct. on £30,000 of consolidated "B" stock, and 8¾ p.ct. on £73,000 of consolidated "C" and "D" stock. This was unanimously carried, and the meeting concluded with a vote of thanks to the Chairman.

Workmen's Compensation Premiums Raised.—Last Friday the tariff accident insurance offices decided to charge an increase of 10 p.ct. in the rates of premium, as from Sept. 1, to meet the increase of 25 p.ct. in the workmen's compensation benefits provided for by the Bill which last week passed its second and third readings in the House of Commons.

The Sheffield Gas Company's New Works.—The Sheffield Corporation Parliamentary Committee report a communication from Alderman Irons, one of the Nominee Gas Directors, stating that the Gas Company do not intend to promote any Parliamentary Bill during the coming year, but would apply to the Board of Trade for permission to put up new works as soon as they had secured the site.

Export Prohibitions.—By an Order in Council of the 14th inst., some modifications have been made in the schedule of prohibited exports attached to the Proclamation of May 10; a number of items being withdrawn and more comprehensive headings substituted. Among others, instead of "valves, gas, steam, and water," there is inserted "valves, metal of all descriptions," followed by "valves, gas, steam, and water not otherwise prohibited."

Coatbridge Gas Company.—In the course of the proceedings at the annual meeting of this Company [see *ante*, p. 244], the Chairman told the shareholders that since their last meeting they had got their Provisional Order confirmed, giving them power to raise additional capital for the erection of vertical and up-to-date retorts; but the Treasury, in their wisdom, had refused permission to raise or spend the additional capital required. This seemed strange, as he understood they had given permission for the spending of a large sum of money on buildings in the vicinity of the works which appeared to him to be of much less national importance, and would be of no assistance in carrying on the war.

Increase Over Contract Price for Gas-Meters at Salford.—At their last meeting, the Salford Town Council confirmed a minute of the Gas Committee, from which it appeared that an application had been made by their contractors for gas-meters for an increase over and above the contract price. It was resolved, having regard to the circumstances with reference to the contract entered into by Messrs. Thomas Glover and Co., Ltd., of Manchester, that the Council should make an exception in respect of the contract and agree to pay an increase of 10 p.ct. on contract prices for all meters ordered by the Corporation from the firm after June 1—the Council reserving to itself the right to reconsider the matter on the termination of the war should such an event take place prior to the expiration of the contract.

Research Work in Domestic Heating at Manchester.—In the supplementary estimates of the Manchester School of Technology, for the year ending March 31, 1918, the Manchester Sanitary Committee (Air Pollution Advisory Board) report that the Committee of the Privy Council for Scientific and Industrial Research have given £150 towards the cost of carrying out chemical analysis and research work in domestic heating appliances (gas, electricity, coal, &c.), subject to certain administrative conditions as to accounting and publishing of results. In view of this grant, the Sanitary Committee propose to increase the salary of the assistant now engaged on the work, and to appoint an additional assistant. The investigations have now been going on for about eighteen months.

Prices at Market Harborough.—The Market Harborough District Council have decided, on the recommendation of the Gas Committee, to increase the price of coke by 2s. 6d. per ton, and also to cancel the charge for stove hire to users of gas through prepayment meters.

Gas Mains Damaged in the Southend Air Raid.—Mr. C. S. Shapley, the Engineer and Manager of the Southend Gas Company, reports that during the air raid by "Gothas" on Southend last Sunday week more than 3 ft. of their 10-in. steel high-pressure main was severed by an aërial torpedo, a 3-in. main was broken, and several services were damaged.

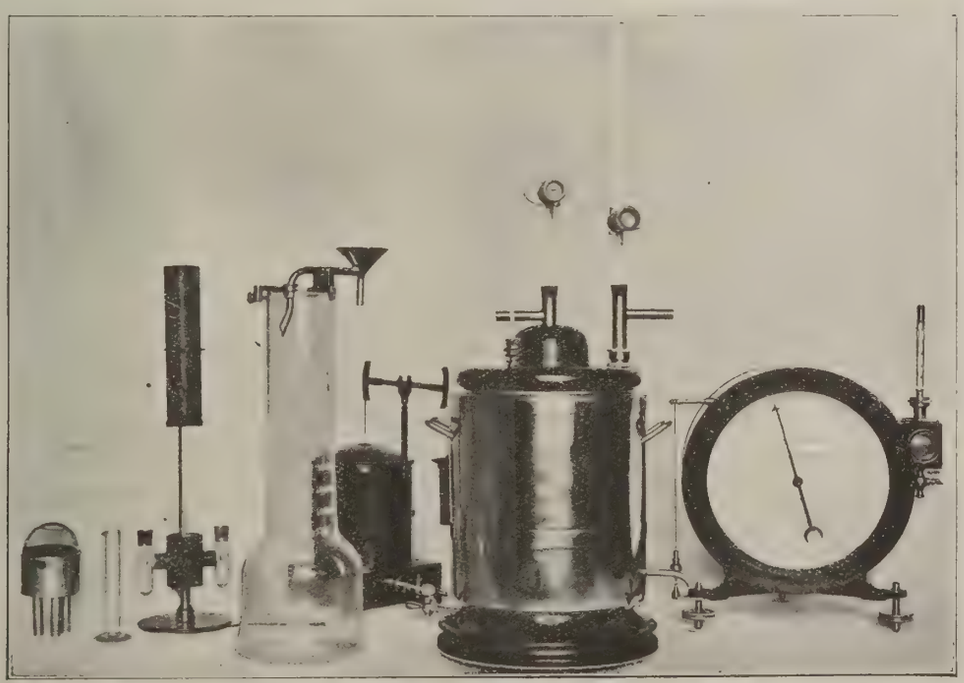
The Household Coal Distribution Order.—The Press Bureau has issued the Household Coal Distribution Order, 1917. It sets forth that the Order does not extend to coal used for industrial purposes—such as the production of gas or the generation of electricity or the raising of steam, except where such industrial purposes are subsidiary to the use of coal for household or domestic purposes, as may be the case with large hotels, blocks of residential flats, theatres, churches and chapels, clubs, meeting rooms, baths, public buildings, and institutions, &c., to all of which the Order extends. The Order also extends to industrial purposes where the industry, trade, or business is carried on in a dwelling-house or in a building used in connection therewith.

Lighting Restrictions at Malvern.—At the last meeting of the Malvern District Council before the recess till October, Sir H. Urwick brought forward the question of mitigation of the lighting restrictions in Malvern before the dark nights set in, and suggested that the Council should ask the authorities to give permission for a limited lighting or an extended time for keeping the lights going. The Chairman said the question rested with the police authorities and the Standing Joint Committee of the County Council. He promised to represent the views of the Council, and ask for the lamps to be wholly or partially lighted. Mr. Trow Smith (Gas Engineer) said he could light 150 lamps provided with clockwork controllers. He did not know where to get male lamplighters; all his staff had gone.

A Birching for a Slot-Meter Thief.—At the Burslem Police Court, last Tuesday, a thirteen-year-old boy was summoned for breaking and entering a workshop and stealing from a gas-meter there the sum of 13s., belonging to the Wolstanton Urban District Council. It was stated that the owner of the workshop noticed that the connection between the money box and the padlock of the meter had been broken. A sum of 8s. remained in the money box. A gas-meter inspector said that, according to the reading of the meter, there was 13s. missing. A police-constable spoke to interviewing the boy, who, after first saying he knew nothing about the theft, admitted that he had had 13s. out of the meter. It was also stated in evidence that the boy had been employed at the shop prior to last December, and knew how to open the door through which he put his hand to reach the meter. The decision of the Court was that the boy should receive six strokes of the birch rod.

BOYS CALORIMETER.

Gas Referees Latest Pattern



COMPLETE
with
HYGROMETER,
and
Printed Tables
and Formulæ
for converting
RESULTS of TESTS
into
TOTAL HEAT
B.Th.U.

ALEXANDER WRIGHT & COMPANY, LIMITED,
WESTMINSTER.

Gas-Driven Motor-Car at Oldham.—Last week the Oldham Gas Department's small Ford motor-car was seen on the streets driven by gas contained in a bag supported on a frame. If the experiment is successful, the cost of the driving power will be equivalent to petrol at 6d. or 8d. a gallon.

Arbroath Gas-Workers.—At last week's meeting of the Arbroath Gas Committee consideration was given to a claim by the labourers at the gas-works for an advance of 8s. per week in wages. It was agreed to raise the wages to the standard rate, which is equal to an advance of 4s. 3d. per week, and also to increase in proportion the wages of certain other employees at the works.

A Peremptory Demand.—The Oldbury and District Trades and Labour Council have sent the following resolution to the Oldbury District Council: "That this Council demands an immediate substantial reduction in the price per 1000 c.ft. of household gas, being satisfied that, in view of the very profitable year's trading at the gas-works, and that the District Council have been able to increase the salary of the Manager at the gas-works, the time is now ripe for a decrease."

Southend Gas Company.—For the half year to June 30 the net profit of this Company rose from £8478 to £11,325; and while the dividend on the original and new ordinary stocks is to be increased from 5 to 5½ p.ct. per annum, the rate on the "B" stock is to be 5⅛ as against 4⅞ p.ct. The balance forward will then be £1384, in contrast with £551 and £120 transferred from the reserve a year ago. The sales of gas were just over 200 millions, and compared with last year increased 10 p.ct. A considerable number of cooking and heating stoves are being disposed of.

Gas Discounts Reduced at Marple.—At this month's meeting of the Marple Urban District Council, the Gas Manager (Mr. J. K. Law) submitted a report on the increased cost of gas production; and it was resolved, on account of the increased cost of all materials and labour, that the Council reduce the rate of discount by 2d. per 1000 c.ft.—such reduction of discount to take effect at the end of the September quarter. Mr. Allan moved the adoption of the report, and said the increased cost of materials and of wages made it necessary to do something to meet the charges. Few gas undertakings had gone on as long as Marple without increasing their charges. The Council were not now going to increase the charges of gas but to decrease the discount. This course was agreed to.

Shrewsbury Gas Company.—The ninety-seventh annual meeting of this Company is called for the 1st prox., when the Directors will report that the profit on the year's working to June 30 was £5267. An interim dividend of 2½ p.ct. was paid in March; and the Directors will recommend that a final dividend of similar amount (5 p.ct. for the year) be declared. There was a further small decrease in the consumption of gas during the year, due to the extension of "Daylight Saving" and a further restriction of public lighting. The number of stoves on hire at June 30 was 5308; and there were 4631 slot meters in use. The Directors announce the resignation of Mr. T. F. Poole, who had been a Director for upwards of twenty-five years, and Chairman since 1909. They have selected Mr. Alfred Mansell to fill the vacancy.

Military Tribunal Appeal.—At the Worcestershire Appeals Tribunal last Tuesday the military appealed against the exemption granted to Mr. Laurence Adlington, the Assistant Manager of the Worcester Gas Company, aged 28, and passed Class A. Mr. E. L. Adlington, the Engineer and General Manager of the Company, gave particulars of the output of the works, where he said men were engaged on three eight-hour shifts every day in the week. The Company had within the last few months undertaken to supply gas to a large factory in the district, and they were also making bye-products for the Ministry of Munitions. His son was the Assistant Engineer, and was a highly-qualified and trained man, who had passed with first-class honours in the examinations in "Gas Manufacture." The Minister of Munitions had recently requested them to put all their stand-by plant into operation at once. Exemption was given until Sept. 30—this being final.

Price of Gas at Hastings.—Notice was given by the Hastings and St. Leonards Gas Company on June 23 that, in accordance with the sliding-scale clauses of the Company's Act of Parliament, the price of gas would be advanced 2d. per 1000 ft. to the standard price as from the current (Midsummer) readings of the meters. In publishing this intimation to the consumers, the Engineer and General Manager (Mr. C. F. Botley) said: "It will be readily understood that this alteration, arising from circumstances entirely beyond control, is taken with great reluctance; and it will be modified at the earliest possible opportunity. There is grave shortage of labour on the works, with consequent trouble and inefficiency. Much of the raw material available is of inferior quality; and obligations imposed in the national interests have to be fulfilled. Mainly due to freightage, the cost of coal has increased 100 p.ct. as compared with pre-war times. To meet this, the price of gas, including the present advance, has been increased 34¾ p.ct.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 15.]

Nos. 11,303—11,587.

Bloxam, A. G. (Zellstofffabrik Waldhof).—"Disposing of waste gases from chemical operations." No. 11,539.

Cook, T.—"Recovery of benzol, toluol, and light oils from coal gas." No. 11,434

Hill, W.—See Cook. No. 11,434.

Jones, F. J. C.—"Manufacture of gas and coke." No. 11,305.

Selas-Turner Company.—"Gas and air regulators." No. 11,425.

Styles, T. W.—"Adjustable brackets for lamps." No. 11,443.

Tinker, F.—"Distillation of coal and shale." No. 11,338.

Turner, E.—See Selas-Turner Company. No. 11,425.

Zellstofffabrik Waldhof.—See Bloxam. No. 11,539.

SOUTH METROPOLITAN GAS COMPANY.

New Issue of Capital with the Sanction of the Treasury.

Particulars of Sale by Tender of

£250,000

FIVE PER CENT. REDEEMABLE PREFERENCE STOCK.

(Pursuant to the Powers of the South Metropolitan Gas Act, 1916.)

Minimum Price of Issue, £94 per £100.

The Stock will be Redeemed by the Company at par on the 31st December, 1924.

The Directors are prepared to receive Tenders for £250,000 of Redeemable Preference Stock at a minimum price of 94 p.ct.

The Stock will be redeemed by the Company at par on the 31st December, 1924, and will rank next after the Debenture Stock of the Company from time to time existing or authorized.

A deposit of £5 p.ct. of the nominal amount of Stock tendered for must accompany each Tender, and the balance of the purchase money must be paid to The London Joint Stock Bank, Limited, 28, Borough High Street, S.E. 1, or to the London and South-Western Bank, Limited, 170, Fenchurch Street, E.C. 3, on or before the 4th day of September, 1917.

Any amount being not less than £100 may be tendered for, and the Stock will be registered in the books of the Company in the names of the purchasers, or their nominees, free of expense.

Where no allotment is made the deposit will be returned, and in case of partial allotment the balance of the deposit will be applied towards payment of the amount due on allotment.

Dividends on the Stock will be payable half-yearly on the 15th January and the 15th July in each year. The first dividend at the rate of £5 p.ct. per annum, calculated from the dates of payment to 31st December, 1917, will be paid on the 15th January, 1918.

The present Capital of the Company is £6,609,895 Ordinary Stock and £1,895,445 Debenture Stock. Power has been taken to raise a further sum of £500,000 by Mortgage or Debenture charge.

The net profit available for dividend on the Ordinary Stock, after setting aside £56,864 per annum for interest on the existing Debenture Stock and providing for interest on temporary loans, was for the past three years as follows:—

1914	£279,458
1915	£309,642
1916	£309,340

In the half year ended 30th June last, the sales of gas, notwithstanding the lighting restrictions, exceeded those of the corresponding period of 1916 by 806,000,000 cubic feet, an increase of 12 p.ct.

To meet the greatly increased costs due to circumstances arising out of the War, the price of gas was raised as from Midsummer last to a figure which it is estimated will be sufficient to cover such additional charges.

The following statement is made by direction of the Lords Commissioners of His Majesty's Treasury:—

> The Treasury has been consulted under the notification of the 18th January, 1915, and raises no objection to this issue. It must be distinctly understood that in considering whether they have or have not any objections to new issues, the Treasury does not take any responsibility for the financial soundness of any schemes, or for the correctness of any of the statements made or opinions expressed with regard to them.

The consent of the Committee of the Stock Exchange has been obtained to dealings in the Stock after the issue of Allotment Letters. Application for an official Stock Exchange quotation will be made in due course.

A commission of one-quarter per cent. will be allowed to Bankers or Brokers on allotments made in respect of applications bearing their stamp.

Copies of this Prospectus and Forms for Tenders may be obtained from the London Joint Stock Bank, Ltd., Princes Street, E.C. 2; the London and South-Western Bank, Ltd., 170, Fenchurch Street, E.C. 3, or any of their respective Branches; at the Offices of the Company, 709, Old Kent Road, London, S.E. 15; or from Messrs. Rowe and Pitman, Pinners Hall, Austin Friars, London, E.C. 2.

Tenders must be sent to me on or before Friday, the 24th of August, 1917, after which date no Tender can be received.

By order of the Board,

F. McLeod, Secretary.

709, Old Kent Road, S.E. 15,
Aug. 15, 1917.

Halifax Workers' Wages.—The Committee of Production have made an award for 9s. per week advance on pre-war rates of pay for the semi-skilled employees of the Halifax Corporation. The men's demand was for 12s.; the Corporation offered 8s. About 500 employees are affected.

Price of Gas in Glasgow.—The Gas Committee of the Glasgow Town Council have fixed the rates for gas until further notice as follows: An increase of 2d. per 1000 c.ft. for lighting and domestic purposes, or 2s. 8d.; and an increase of 4d. for gas for power and manufacturing purposes—bringing the rate up to 2s. 5d.

STOCK MARKET REPORT.

THE Stock Exchange last week was able to contemplate an improvement in the general state of things as compared with the week before. To begin with, there was more animation in many markets and almost an approach to activity—if such a thing be possible in mid-August—and this was coupled with a decidedly cheerful tone. Two factors co-operated to bring about this gratifying feature—first, the marked progress at many points in the Western front, culminating in the capture of Langemark, and, second, Mr. Lloyd George's frank and lucid statement in the House of Commons upon the general position of affairs. In result, pretty well every department which was not chilled by special depression was able to show an advance.

The gilt-edged market was almost wholly good. Home Government issues were in demand. All War Loans were firm, and the 4½ p.ct. even made a further advance, although the date of the next loan is still in hiding. Consols, 6 p.ct. Exchequer Bonds, and some Colonials were strong. Home Rails were at first perturbed by strike fears, but made some recovery before the close. Argentines were similarly affected, and Canadians were inclined to droop.

In the Foreign Market, the pleasing feature was a recovery in Russians inspired by more confidence in the pacification of that afflicted land. French were also in good request, and Scandinavian and Japanese moderately so. Mexicans, too, were in better favour. The South African Market was firmer.

Business in the Gas Market was a very fair aggregate on the whole, though some days were very quiet, and the general characteristic was marked steadiness. Prices of bargains transacted were almost identically similar to those of the week before, and changes in quotation were all arising from *ex div.* adjustment, with the sole exception of Primitiva preference, which had a slight fall. Several important company meetings were held in the course of the week; and one gratifying feature of them was the ready recognition by the shareholders of the cares and anxieties which have beset directors and officers in their conduct of the business.

Bargains done for cash during the week were as follows: On Monday, Bath ordinary 82, 82¼, ditto debenture 67, 67½, Brighton and Hove ordinary, 102, Gas Light ordinary, 68, Metropolitan of Melbourne 94, Primitiva 39s., 39s. 6d., Southampton debenture 66⅞, 67. On Tuesday, Alliance and Dublin 53½, 53¾, Gas Light ordinary 68¼, 68¾, 69, Monte Video debenture 75, Primitiva preference 57s. 6d., South Metropolitan 72¼, 74¼, 74¾, 75, ditto debenture 55¾, 56, South Suburban 76½, 77, 77½. On Wednesday, Gas Light ordinary 68, 68¼, 68½. Imperial Continental 79¼, Primitiva 36s., South Suburban 75. On Thursday, Gas Light ordinary 68, 68⅜, 68¾, Imperial Continental 79¾, 80½, Primitiva, 36s., 36s. 6d., ditto preference 55s., South Metropolitan debenture 56, South Suburban 75½. On Friday, Continental Union, 39½, ditto preference 61, European 11¼, Gas Light ordinary 68, 68¼, 68¾, ditto preference 70½, Imperial Continental 79¾, 80, North Middlesex 10¼, Primitiva 36s., 36s. 6d., 36s. 9d., 37s., ditto preference 55s. 7½d., 57s., South Metropolitan 72¼, 74, ditto debenture 55¾, 56, 56¼.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref. .	..	57—62*	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	53½—53¾
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5½	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c.	29—30	24—26	..
383,110	10	,,	7	7/-	B 7 p.c.	15—15½	10⅜—11½	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	9¼—9⅜	..
159,740	—	—	—	4%	4 p.c. Deb.	..	6⅜—7⅛	..
992,045	Stk.	Feb. 26	14	5 1/16%	Brentford A Consolid. .	261—266	79—82	..
734,920	,,	,,	11	4 4/16%	Do. B New . .	204—209	77—80	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb. .	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig. .	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	102
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk..	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2½—3	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref. . .	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	79½—80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk. .	106—108	72—74	..
560,000	,,	,,	5½	46/8	Do. 3½ p.c. do. .	103—105	66—68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	61
278,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd. . . .	17½—18	11—12	11½
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord. . .	98—102	67—69	68—69
2,600,000	,,	,,	3½	3½%	3½ p.c. max. . .	76—79	54—56	..
4,062,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	70—72	70½
4,674,850	,,	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	55—57	..
130,000	,,	,,	10	10%	10 p.c. Bonds .	..	..	..
258,740	,,	Mar. 12	5	4 1/16%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅞	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c.. . . .	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7 8/16%	Ilford A and C. . . .	151—154	95—100	..
65,780	,,	,,	6⅜	5 4/16%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb. . . .	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental .	150—160	79—84	79¼—80½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c. .	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	82—83	..
					{ B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72*	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅝	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98	94
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11⅛—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c. .	14—15	10—11	10½
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7⅛—7¾	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B . .	128—131	92—97	..
100,000	50	,,	12	11%	Do. C . .	118—121	85—90	..
52,000	50	,,	10	9%	Do. D . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅜—6	1⅜—2	36/-- 37/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref. .	4⅝—5	2⅝—2⅞	55/—57/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb. .	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb. .	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref..	10⅛—11	7⅜—8¼	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb. .	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	180—184	..
209,984	,,	,,	10	10%	Do. B	222—224		
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African. . . .	10⅛—11⅛	8⅛—9⅛	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord. .	111—113	73—75	72¼—75
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb. .	72⅛—74⅛	55—57	55⅜—56½
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	140—142	..
952,795	,,	,,	6	4 8/16%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76*	75—77½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref. . .	110—112	75—77*	..
135,000	—	—	—	4 8/16%	Do. West Kent . .	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord. . .	99—102	76—78	..
120,000	,,	Feb. 12	7½	5%	Tottenham and District { A 5 p.c. .	135—138	95—100	..
782,275	,,	,,	6	3¾%	{ B 3½ p.c. .	115—117	68—73	..
181,255	,,	June 26	4	4%	{ 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c..	151—156	114—119	..
255,636	,,	,,	6⅞	65/-	Do. B 3½ p.c. .	129—134	99—101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c. .	110—115	86—91	..
352,000	,,	,,	6⅛	58/9	Wimbledon 5 p.c. . .	117—122	88—93	..
98,000	,,	,,	6⅜	65/-	Epsom 5 p.c. . . .	121—126	96—101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk. . .	66—69	50—53	..

* Ex. Div.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

DEPUTY ENGINEER AND MANAGER Ormskirk Gas and Electricity Company. Application by Aug. 31.
GAS MANAGER. Whitehaven Gas Company. Applications by Aug. 25.
WORKING MANAGER (Charlbury, Oxon). Applications to W. A. Scott & Co., 50, Cannon Street, E.C.
CHEMIST. No. 6336.
CHEMIST-ENGINEER. No. 6338.
DRAUGHTSMAN. R. & J. Dempster, Manchester.
DRAUGHTSMAN. No. 6337.
GAS STOKER. Bexhill Water and Gas Company.
MECHANIC. Kettering Gas-Works.
STOKERS. Ormskirk Gas and Electricity Company.

Agency.—Mechanical Engineers. No. 6335.

Tank Wagons for Hire.—No. 6333.

Plant for Sale.

PURIFIERS, SCRUBBERS, EXHAUSTERS, METER, &c. Leatherhead Gas Company.
TAR EXTRACTORS. Easten's Ltd., London.

Plant, &c., Wanted.

STATION METER. No. 6334.
TANK WAGONS. No. 6330.

Meetings.

BRIGHTON AND HOVE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 7. Two o'clock.
HARROW AND STANMORE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 3. 3.30 o'clock.
NORTH MIDDLESEX GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 3. 2.30 o'clock.
SOUTHGATE GAS COMPANY. No. 5, Great Winchester Street, E.C. Sept. 6. 3.45 o'clock.

TENDERS FOR—

Coke Breeze.
Swindon Gas Company.

General Stores—Shovels, Iron and Steel, Brooms, Cotton Waste, Oil, Lime, Glass, Lamp Irons, Brass Goods, &c.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

Meters.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

Pipes, &c.
BRADFORD GAS COMMITTEE. Tenders by Aug. 27.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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See illustrated Advertisement Feb. 20, p. III. of Centre.

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THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, May 15, p. 268.

SOUTH WALES TAR COMPANY,
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ORMSKIRK AND DISTRICT GAS AND ELECTRICITY COMPANY.

THE Directors invite Applications for the Post of TEMPORARY DEPUTY ENGINEER AND MANAGER. Salary £175. Annual Make, 80 Millions.
Also Two TEMPORARY STOKERS with Union Wages.
Applicants must have previous Experience and be Ineligible for Army.
Applications, in writing, before Aug. 31.
A. Dickinson,
Secretary.

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THE above Company invite Applica- tions for a PRACTICAL GAS MANAGER Annual make, about 40 Millions. Candidates must have Experience in Sulphate of Ammonia Manufacture and Carbonizing Methods.
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J. H. Studholme,
Secretary.
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TANK WAGONS.—Wanted to Pur- chase, suitable for Tar and Gas Liquor Traffic.
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GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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VOL. CXXXIX., No. 2833.] TUESDAY, AUGUST 28, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Increased Tar Production Muddle.

THE gas profession appears to be in a most uncomfortable mess and state of perplexity and indecision regarding the request made by the Ministry of Munitions early this month for the carbonization of coal to be conducted to the fullest practicable extent instead of water-gas making, and in a manner that will ensure the maximum possible output of tar, in order to secure a larger supply of fuel oils. The favoured and recommended proposal to realize this was the adoption of lower carbonizing temperatures; and, in our first editorial last week, it was suggestively submitted that, *viâ* this route, the desired objective would never be reached, owing to the reduced aggregate tar production that the existing coal carbonizing plant, worked at lower temperatures and so having its capacity diminished, would yield, though per ton of coal carbonized at those temperatures there might be some increased production. It was further submitted that the lower temperature carbonization would affect the quality of the benzol and toluol for explosives making, besides involving a financial and a labour requirement which would put the idea outside the bounds of both feasibility and commonsense. It seems to be perfectly clear that confusion has arisen from ill-consideration; and it is not therefore surprising that a gas engineer of position should, through our "Correspondence" columns this week, urge the Executive Committee of the National Gas Council, with the gas engineers who have been co-opted for consultative purposes in connection with this matter, to furnish the gas profession at once with some light and leading as to what is the best course for them to pursue.

The war has proved that there is no more loyal industry than that devoted to gas supply. It has been asked to make many sacrifices. It has made them; and, in return, it has secured precious little help, consideration, and protection from the Government authorities. Reciprocity is a rare quantity in some quarters. However that may be, when the gas industry is asked to do something that very little consideration shows must negative the very result that is required, and bring other bad effects in its train, then it is time for pause and protest. Directly the new appeal was made, there were gas engineers who took for granted that they were at liberty to adopt any method they thought would conduce to the larger production of tar per ton, and would be compensated by the Ministry of Munitions for any expense and loss incurred. But when the cost of what was being done—the sacrifice for which compensation was hoped for—was seen, it was so startling that the National Gas Council had to appeal to gas engineers to "hold their hands," inasmuch as the Ministry of Munitions are not prepared to make monetary amends for loss unless their own Inspector approves of the proposals that are made, and unless they are accepted by the Ministry. Therefore, though the maximum possible production of fuel oils is essential, it must not be expected that there will be compensation for loss, unless what is specially done is sanctioned by the Ministry, who cannot be expected to pay an exorbitant sum for a possible lower aggregate output of tar. It would not be good business; but it appears that that is what the original suggestion actually amounts to. It seems pretty clear, too, that the best that can be done to increase the output of fuel oils, without injuring the quality of benzol and toluol for explosives making, is not to reduce carbonizing temperatures, but to maintain them, use the maximum retort capacity, and encourage householders and industries to consume as much gas as possible, so as to get to work any surplus coal-gas plant. This is a widely held view; and it has an obvious rationality about it as being the right course to pursue, and so to obviate, in addition, the waste of precious time in attempting to answer such questions as: "What is the estimated cost of making "the above quantity of gas [the gas produced by the works "in question] by reducing carbonization to 9000 c.ft. per "ton of coal?" This is a question that no gas engineer can answer without investigation and experiment with his plant and coal; and estimates that are pure guesswork might fall very wide of the line of accuracy—more especially when it is asked that the increased make of tar and coke per ton of coal carbonized should be credited to the lower temperature carbonization. Some engineers are estimating their losses, even if the lower temperature work could be continued, at anything between a few shillings up to ten shillings per ton of coal! The additional creosote oils obtained in this way would prove rather expensive.

Our "Correspondence" columns this week also contain a contribution from Mr. John West which incorporates some details which are as remarkable as they are enlightening not only in relation to this tar question, but in respect of low-temperature carbonization as a commercial proposition for the gas industry. It is gratifying to his friends to see the veteran gas engineer emerging from his partial retirement, and vigorously taking part in investigations the results of which have a large bearing upon problems associated with the greater advance of the gas industry in the service of community and industry. His data are convincing; and they give him complete warrant for taking a strong stand in this particular matter of high and low temperature carbonization for the production of tar in existing circumstances, and, for the matter of that, for any other purpose in which gas engineers are concerned—gas yield especially. But our immediate interest is with tar. There is a limit to the coal-gas retort plant possessed by all gas-works, which limit has been provided in compliance, using high temperatures, with the demands of the maximum demand season, which is now approaching. The figures which Mr. West presents to us (obtained from a seven months' research made under the conditions described in his letter, and with, so far, some 3000 tons of coal of different varieties) confirm in every particular the submission made in our editorial last week as to the lowering of temperatures reducing the coal-carbonizing capacity of the retort plant, and thus the total output of tar, and this very seriously. The gas industry has been invited to take a step in the dark; Mr. West illuminates the road along which it was proposed that the step should be taken. His figures will either have to be proved erroneous, or some substantial reason be advanced for perseverance with the low-temperature plan for enlarging the production of tar, before there can be insistence upon the adoption of the proposal anywhere.

Take one set of results—the retorts employed were the Glover-West vertical type—from a test with a poor quality of coal. At 2562° Fahr., 43·1 tons of coal were carbonized in four days; the yield of tar being 259 gallons. The temperature was then dropped 769° to 1793° Fahr., and the coal carbonized in four days was then only 12·97 tons, yielding 140 gallons of tar—a loss of 119 gallons, or 46 p.ct. But the production of tar (dehydrated) per ton of this "poor" coal with the high-temperature carbonization was only 6 gallons, while with the lower temperature work it was 10·8 gallons. Next take a good quality coal in another test. At a temperature of 2559° Fahr., 34·22 tons were carbonized; at a medium temperature, 2120° Fahr., in the same period, 17·73 tons were carbonized—a drop of close upon half. The yield of dehydrated tar per ton at the higher

temperature was 13 gallons; at the lower temperature, 16·5 gallons. But from the same retorts in the same length of time through the greater quantity of coal carbonized, no less than 447 gallons of tar were produced at the higher temperature, against 292 gallons at the lower temperature —a drop of no less than 155 gallons, or 34·7 p.ct. What is to be said of such figures as these, when the adoption of low temperatures is advocated for increasing the production of tar?

But Mr. West goes further, and supplies some information which corroborates that which we recently obtained from Mr. J. E. Blundell, of Macclesfield [see "Journal" for July 17], as to the results of steaming the charges. Two tests are given by Mr. West with temperatures a little over 2500° Fahr., in the first case without steam, and then with steam at the rear-end of the charge. A good quality coal was used; and the mouths will water of many engineers when they see that the make of gas is raised per ton of coal to 16,603 c.ft. (505 B.Th.U.) with steaming from 14,032 c.ft. (533 B.Th.U.) without steaming; while the production of tar from the quantity of coal used was raised to 640 gallons, or 20 gallons per ton, from 556 gallons, or 16·8 gallons per ton. This is an achievement for steaming that is fraught with much significance in our progress in economical gas manufacture. But the point of interest in connection with the subject specially under consideration is that the tar per ton, and that for the same total weight of coal carbonized in the same period, is so much increased —not by resort to low temperatures, but by steaming, with concomitant effects of a very valuable order.

Now in face of these figures, in face of the position of the gas industry in having to serve the Government in respect of not only fuel oils but benzol and toluol, in face of the requirements of the community and industries for gas and coke, fertilizers, &c., in face of the limitations of the coal-carbonizing plant and labour, it seems that in respect of the temperature-reducing proposition some one has blundered. We know the question of tar quality comes in; but if the much greater bulk of tar produced per unit of plant and in a given time using high-temperature carbonization is not better for the dual purpose of the Ministry of Munitions than the much smaller quantity, then it would be well to know the reason why. If a mistake has been made, then the sooner it is acknowledged and rectified the better, for many gas engineers are at the moment in a quandary. If it is tar quantity that is wanted, then they will work rather to get the largest bulk per day per retort than per ton of coal, which is a different matter—particularly in the final issue.

A Minimum Bonus and a Pension Scheme.

There are some people who think that the war is going to kill co-partnership as practised in the gas industry, owing to the temporary banishment in some cases of the bonus through the operation of war conditions. We hold that the intelligence—at any rate, in this matter—of those gas workers among whom co-partnership does not begin and end in bonus, but in whom the spirit and full intention of the system dwell, is greater than that of those who predict such a dire result. If we thought co-partnership only fitted in with the smooth times of peace, our interest in it would have a big fall. But what are the facts? The intelligent gas worker looks to his stockholding which has been brought into being by the system. That, he well knows, exists; it is something substantial, and cannot be extinguished. "What "has been in respect of its accumulation," he very wisely "argues, will again be when we have settled accounts with "the enemy." He looks at the amicable relations that have been, through co-partnership, engendered between directors, officers, and workmen generally; and he finds that these also continue to exist. And the fact that the concern in which he is a partner is ploughing through stress and storm only braces him up to do his best part to help to alleviate the difficulties. Duty with him is something with a solidity about it, and is not a hollow sham. We admit that all co-partners are not actuated by this spirit, nor do they all give evidence of co-partnership being with them a reality. But, very fortunately, they are not the whole number. The officers of every company in which the system exists are glad to acknowledge this. We ourselves have seen letters from co-partnership gas men at the front which prove that there is a genuine union between them and the company at home which has been formed and nurtured by the principles which underlie the co-partnership system. There is an actuality about all this; and the proof of it has been given by the test of an unpremeditated adversity.

At various meetings of gas companies recently—in connection with which companies the co-partnership bonus has been temporarily extinguished through the heavy rise that war conditions have compelled in the price of gas—proprietors have urged the Directors to consider whether something cannot be done to continue a distribution bonus—at any rate, in a small way—so that there may not be any interruption to the life and inspiration of the system. There are some co-partners who would regard this as an insult to their judgment and feeling as to what constitutes a contract and an obligation. On certain terms, they accepted co-partnership. To these terms, they say: "Let us "stand." That is the true co-partnership spirit. There are others who require the stimulant of a bonus. But some co-partnership companies whose war conditions have obliterated all financial margins and freedom of action would have to further raise the price of gas in order to give the co-partners a bonus outside the terms of the system; and the result of this would be that the slender dividends of the stockholders would undergo further diminution. Probably the well-intentioned stockholders have not thought of this. On the other hand, there are some stockholders who point to the fact that, though the co-partners' bonus has temporarily disappeared, the men still at work are receiving war bonus, and the dependants of the men at the front are having monetary assistance. We are not of those who hold that these payments are, or should be regarded as, any set-off to the loss of the co-partnership bonus. The payment to dependants is a humane obligation, which accentuates the bond existing between employers and employed. As to the war bonus, war conditions have brought grave hardship upon those of limited income, and have altered entirely their purchasing power. The craftsman and the labourer, and their wives and families, must be fed and clothed. The underfed craftsman or labourer would be of no use whatever to the employer; but the necessities of life cost more. This means that just as the higher expense of materials causes the cost of gas into the holders to be higher, so the heavier expense of food and clothing means that the cost of keeping fit and efficient has also gone up and so therefore has the value of the labour rendered. In other words, to produce and maintain physical fitness costs more under war conditions than formerly; and so it must be paid for. This being so, we cannot recognize the war bonus as a counterpoise to the loss of the co-partnership bonus. The two things are widely separated.

However, whether or not a company can do anything to continue the co-partnership bonus must depend entirely upon its financial conditions in present circumstances. In some companies where the matter has been broached by stockholders, the chairmen have acknowledged that it may be that, just as in the case of the sliding-scale of prices and dividend, the basis of the co-partnership scheme requires modification, so as to fit it for exceptional times, and prevent a gap in the bonus distribution. The Directors of the Bournemouth and Croydon Gas Companies have found a simple way of dealing with the matter—by adopting the principle of a minimum bonus of 4 p.ct. at and above a certain price of gas. The matter was explained at the meeting last Friday of the proprietors—in the case of the Bournemouth Company by Mr. G. Crispe Whiteley, and in the case of the Croydon Company by Mr. Charles Hussey. Reports are published elsewhere in this issue; the fuller details being given in the Bournemouth proceedings. In this way, the Companies have averted the discontinuance of the bonus and the method of doing it may be commended to the consideration of other companies who are discussing the question of modification. It is freely admitted by both the companies that theoretically the co-partnership agreement should stand, but that this is a case in which the extinction of the bonus, through the extraordinarily high price of gas, is not the product of normal movements such as were only in contemplation at the time of the framing of the terms of the co-partnership schemes, but of the abnormal circumstances of war, in the responsibility for which the employee co-partners had no part. This is a recognition that can also be applied to the position of the stockholders in respect of the sliding-scale of price and dividend. Both Companies have gone beyond this amendment of the terms of the co-partnership system, and have adopted in conjunction with it a definite pension scheme, which confers the right to

certain pension, according to wages and length of service at a certain age, and part of the men's contribution to which is taken from the bonus. The men have through the co-partnership system been educated to keep an eye on the future; and the pension scheme, as an integral part of the co-partnership system, is something which has proved very acceptable to them. In this respect also, the general terms can be gathered from the report of the proceedings at the meeting of the Bournemouth Gas Company; and no doubt this publicity will prove suggestive in other cases in which a definite pension scheme does not already exist. We trace in the fundamental lines of these new co-partner pension schemes the plan that originated with (the late) Mr. Ebenezer Topley, as delineated by Mr. A. E. Broadberry, in his Presidential Address last June to the Institution of Gas Engineers. The scheme has been inaugurated at Tottenham; and at the last meeting of the proprietors of the Company, the Right Hon. Sir Daniel Goddard stated how the Directors had made a special grant to compensate for the two-thirds part of the men's contribution from the co-partnership bonus, which has fallen through owing to the temporary extinction of the bonus. With a minimum bonus, Bournemouth and Croydon will not have to make a special contribution in order to keep the pension scheme alive.

Rate-Aided Competition and Concerted Action.

Ever since the advent of public electricity supply, gas companies have suffered severely from rate-aided competition. But, at the present time, they are doing so in an intensely aggravated manner, and in circumstances that are unjust and disreputable to the administrators of the municipal electricity undertakings concerned. As we have said before, we say again that such trading can only justify municipal management by being conducted upon lines that make it innately financially sound. Aggravation of the injustice at the present time is found in the conditions that through the war obsess the gas industry. There are the depressing costs of coal delivered, the difficulties with and now suspension of oil supplies, the conditions of labour, the work that is being done for the Government for national purposes (which, while it should elevate the industry in the eyes of patriots, only tends in some areas to engender opprobrium, and a transfer of custom), and the control that is being exercised over the prices of, and dealings in, certain of the products of gas-works—on all of which fall the heavier obligations of the gas undertakings as tax and rate payers under war circumstances. There was a just cause of complaint in normal times over the running of competing electrical undertakings by local authorities in a way that brought upon the ratepayers generally—and weightily in the case of gas companies—the unjust obligation to discharge part of the cost of supplying electricity to those who require it. If unjust in normal times, what can be said of the present position, when additional war costs are in many cases being only partially placed upon electricity consumers, and, with shameless indifference, the balance is being levied from the ratepayers, who have already a big pack of war burdens to bear. The position is a monstrous one.

The objection of gas companies is the twofold one of having to work against rate-aided competition, and to share materially in that rate-aid to their own disadvantage—in other words, to help to finance their own competitors. The South Suburban Gas Company recently raised the question in connection with the Beckenham District Council electricity department. At the meeting of the proprietors of the Company, the Chairman (Mr. Charles Hunt) dealt with the matter, and allusion was made to it in our "Electricity "Supply Memoranda" last week. The protest of the Company led to the matter being referred to the Local Government Board, whose advice to the District Council was that the charges to the consumers should be raised, so that the electricity undertaking might be put into a position in which it could discharge its own proper obligations. The advice was not palatable to the Council. They prefer to continue what we regard as the immoral course of making up the difference between revenue and outgoings by appropriating money from the pockets of the heavily burdened ratepayers. Beckenham is not a solitary instance of this. There are many more examples. Hastings is one. Despite an increase of 20 p.ct. for current, there has been a loss on the Corporation electricity undertaking for the past two years; and it will be remembered that this concern has had a particularly unsatisfactory history in the matter of finance as well as of other proceedings. A year ago the loss was £5786; and accounts recently presented to the Council show there is again a deficiency of £5291. We see that the Gas Company have increased their charge for gas right up to the standard—that is to say, by 35 p.ct.; and even this is insufficient to meet the statutory dividends and other obligations, owing to the enormous increase in the cost of coal, other materials, labour, &c. What possible finesse can be brought to bear in arguing that equity is complied with by allowing a municipal trading undertaking to increase their charges by 20 p.ct. and draw the balance of deficiency from the pockets of the ratepayers, thus competing with a private concern that must considerably advance its prices to get any return at all upon its capital, and that return now, by legislative enactment, a greatly reduced one. The loss incurred by the electricity supply is simply launched upon the rates; and, though the ratepayers save something by the suspension of electric public lighting, they last year still contributed under this heading £732, or about four times as much as the charge made by the Gas Company for public lighting.

Calculating from the electricity accounts, the total average working cost per unit sold last year was 3·6d. For private purposes 785,084 units were disposed of, and of these 252,533 units were sold at less than the average working cost. The 20 p.ct. on the lighting flat-rate brings it practically to the maximum of 8d.; but there is no reason whatever why the charge for the lower priced units should not have been advanced all round, instead of coming under the general increase of 20 p.ct. If any argument can be brought to bear upon this suggestion, then it is that electricity cannot be generated and sold at a commercial price to-day in competition with other agents. Are the electricity suppliers prepared to admit this? The Hastings Electricity Department anyway would hardly care to stand responsible for such an admission. But there is still another course open; and it is that an appeal be made to the Board of Trade to increase the Provisional Order maximum price (it has been done in the case of certain other indigent concerns), so that more revenue can be drawn from the lighting consumers. Why not? If the metallic filament lamp is such a wonderful economizer over the old electric lighting conditions, then there is ample room for a still higher charge than was fixed in the carbon filament days. But when the accounts of the department were under discussion in the Council, not a word was said as to adopting any means to endeavour to make ends meet. The easy but crude and dishonest course of lumping the deficiency upon the ratepayers was the one that commended itself to the administrators of the civic affairs of Hastings. One councillor unblushingly acknowledged that the deficiency was £1000 less than was anticipated; and the matter of a big deficiency was one that was considered worthy of the commonplace joke, that "they were not calling upon "the ratepayers to pay any large excess profits tax." The Council are doing something infinitely worse.

The Committee who have in hand the management of this deficiency producing electricity undertaking are, we believe, the Committee who are, on behalf of the Council, and in conjunction with other corporations, energetically opposing the Gas Company's application for a Calorific Standard Order. This is heaping insult upon injury. The Board of Trade should note the fact, and particularly, too, the one that there is (so we understand) no hesitation on the part of this body to make use, in their opposition, of the present difficulties of the Gas Company—no matter the source of their origin, no matter whether through the war, or in the national service, they are unavoidable. It is quite possible that, through this service, the gas supply is not all it would otherwise be—especially with the increased demand for gas, and the suspension of the supplies of oil. And financial results in relation to the business done, despite the increase in the price of gas, are anything but gratifying. Yet, by force of the combined circumstances, many gas undertakings are being compelled to play right into the hands of rate-aided competitors. This is a serious matter; and we are afraid its full meaning and ultimate result are being lost sight of by many responsible gas men in these strenuous times when there is so much else to be done. Those who have not the same experience, either do not understand or do not care. Just by way of example, it may be mentioned that since 1915 the electricity consumers at Hastings have increased by 134, which indicates that many have been persuaded by the difficulties of the Gas Company, and the smaller percentage increased charge of the electricity supply, to transfer their

custom. If co-operation stands for something more substantial than concern only when self-interest is at stake, then it is the plain duty of those gas companies who are not adversely affected, to stand by those who are. This is essentially a matter upon which there should be concerted action. It has, we know, been mentioned at meetings of various gas organizations—the National Gas Council among them ; but there it remains as negligible. Meanwhile, gas undertakings suffer. Connections are, let us repeat, being made because the percentage addition to electricity prices has been less through rate-aid than that which has had to be made in the case of company gas supply, and because interested parties have made it their business to put into circulation statements as to a depreciated gas quality. This is not a temporary matter ; it will, the changes having been made, have permanent effect. The Local Government Board have told the Beckenham Council that, in their opinion, the proper thing for them to do, instead of putting their electricity deficiencies on the ratepayers, is to raise their charges. This step ought to be made compulsory ; and if the maximum prices mentioned in the Provisional Orders are insufficient for current circumstances, then there should be a waiving of the maximum so long as conditions are opposed to an undertaking honestly paying its way. Gas companies should make a concerted move in this direction, and not leave derelict, to get on best as they may, those undertakings that are now feeling acutely, under war conditions, municipal electrical competition at non-paying prices.

Coal Control and Elasticity.

If there is one thing the Coal Controller never expected, it is that his coal distribution scheme would work without inflicting damage in some individual cases; and it is the aggregate beneficial result that weighs with him. But at the same time the scheme is not of a character that, when a good case is made out for not precisely complying with it, it should be inflexible, and an advantageous modification be refused. In our "Correspondence" columns last week, Mr. Henry Woodall showed conclusively that, in the case of the Aberystwyth Gas Company, of which he is the Chairman, a great deal of financial injury will be inflicted upon the town through the enforced alienation of the Company from the contracts they have made at Ruabon; and, moreover, an injury will be done—through the inferior quality of the South Wales coal which will supplant the supplies from North Wales—to the service which the Company are rendering to the Ministry of Munitions. For the maintenance of the gas supply, more of the inferior coal, more retort power, and more labour will be needed to compensate for the better material of which the Company are to be deprived. The Company have a genuinely good case. The Coal Controller, however, gets behind it by saying in effect that what is, through the transfer of the Aberystwyth gas-coal contracts saved to No. 6 area will to that extent obviate a corresponding tonnage of coal being brought to the district from Yorkshire (No. 5 area); and it is transport that has to take precedence of finance. But still Mr. Woodall maintains that special financial and other hardship should be taken into account. We see no reason why it should not be; but it is easy to discern the difficulty of the Coal Controller, in the matter of drawing the line in making concessions. Between him and those gas undertakings situated as that at Aberystwyth, we share our sympathy. It is impossible to severely take a side in this matter, although we do think that such an excellent case for relaxation as Mr. Woodall presents might receive the Coal Controller's favourable consideration. However, we hope that, before Sept. 8 arrives, the Aberystwyth Gas Company will have in store a good stock of the Ruabon coal.

The Search for Petroleum.

The Petroleum Supply Bill has come as a surprise to many people. They had probably heard of springs of natural gas having been discovered in this country, one of which was some time ago the nucleus of a promoting venture. But its lauded virtues live now—not in deeds, but only in the witching prospectuses which were launched upon a gullible public. There have also been occasional rumours that oil-bearing strata have been struck in this country ; but so far rumour has not had material result. However, it is not likely that the Government would have promoted the Bill to empower the spending of money on the surveying and drilling of the country for natural oil supplies, unless they were of opinion that the search would not be fruitless. And, in this connection, the men whom Mr. Walter Long the other day said he had secured to help in this matter are not likely to allow the country's money to be frittered away uselessly. Prof. Cadman, for instance, has been making considerable study of the question not only at home but abroad. It will be remembered that less than a year ago Dr. William Forbes-Leslie stated, at the Royal Society of Arts, that England was not so entirely destitute of oil resources as many people supposed, and that in the near future the oil-fields of the Kimmeridge outcrop might be supplying much of the oil and petrol consumed in this country. He spoke of the presence in Norfolk of an oil-shale series of very considerable importance. An announcement has just been made, too, that at Huddersfield a well boring penetrated paraffin shales at a depth of 489 ft. and again at 700 ft. These pieces of intelligence, at all events, look promising; and with what is known now as to the probable workable duration of the American natural oil wells, it behoves our Government to see carefully that there is no neglect in ascertaining our own oil-producing capabilities.

The Government Proposals.

And the Government do not intend, if supplies are found, to have them exploited by company promoters, or for excessive personal profit. They are to be developed for national use, and on the most economical terms. That is the simple meaning of the Bill. By it, His Majesty the King is to have the exclusive right of searching and boring for and getting petroleum within the United Kingdom. If any person other than one acting on behalf of His Majesty, or holding a licence under the new measure for the purpose, gets petroleum in the United Kingdom, he is to forfeit a sum equal to three times the value of any petroleum gotten by him. That should be a good deterrent to surreptitious work, for which at the moment we do not see much opportunity. A Petroleum Royalties Fund is to be created, into which is to be paid, in respect of petroleum obtained on behalf of His Majesty, out of moneys provided by Parliament, and in respect of petroleum secured by a person holding a licence under the Act by the licensee, a sum equal to 9d. per ton of petroleum. Subject to expenses, the money is to be distributed among persons interested in the land from which the petroleum is drawn. The recompense does not strike one as erring on the side of liberality. The Board of Trade is the licensing department, and the one that will arrange terms and conditions. Nothing in the measure is to confer on His Majesty or any other person any right to enter on, or interfere with, land for the purpose of searching or boring for or getting petroleum which he does not enjoy apart from the Act. The expression "petroleum" is defined as meaning all petroleum and natural gas, and their relative hydrocarbons (excluding coal and bituminous shales), existing in their natural condition in the strata. It is not intended to adopt any spendthrift attitude in paying for natural gas; for "the sum payable into the petroleum royalties fund in respect of natural gas shall be a sum equal to 1d. for every 10,000 c.ft. of the gas computed on the basis of volume at the barometric pressure of 30 in. of mercury and a temperature of 60° Fahr." These primary provisions are dressed up in an amount of detail which it is unnecessary to notice here.

The Waste in Coal Adulteration.

There has been in the Technical Press a favourable acceptance of the Coal Controller's reorganization scheme to facilitate coal distribution and save unnecessary wagon haulage and all attendant expenses. In every quarter, the broad view is taken that this is a national question, and that the sum-total of national benefit will be worth having, though hanging on to the accumulated advantage there will be not a little individual disadvantage in respect of unaccustomed quality. But the war is giving users experience of extraordinary depreciation of quality; and, since "A. S. H.," in a "Communicated Article," and ourselves in an editorial article on June 19, called attention to the waste of locomotive power and wagon capacity and shipping and the uneconomy and inefficiency imposed on industry by the excessive dross content of coal to-day, men in other industries have also been pressing the point, until the Coal Controller himself, we believe, sees that there is more in it than at first met his eye, and desires to be informed of excesses and the offending collieries. Mr. Norton H. Humphrys has another interesting contribution

on the subject this week, supplementing the one that previously appeared. To "A. S. H.," however, belongs the original credit for calling attention to this matter from the carriage point of view, though others before him had voiced their feelings from the aspect of depreciated results on gas-works and in other heat processes.

Industrial Councils.

In the recently issued interim report of the Sub-Committee of the Reconstruction Committee on Relations between Employers and Employed, it was recommended that the Government should propose without delay to the various Associations of employers and employed the formation of Joint Standing Industrial Councils, in the several industries where they do not already exist, composed of representatives of employers and employed. The Ministry of Labour subsequently invited comment upon the proposals made in the report for dealing with industrial unrest; and a memorandum has been forwarded to us by the Director (Mr. R. T. Nugent) which represents the considered opinion on the subject of the Federation of British Industries—claimed to be by far the largest and most representative body of employers in the country. Mr. Nugent points out, also, that the memorandum is the first authoritative public pronouncement by employers on this important question. The Federation cordially welcome the views expressed by the Committee as to the important part which must be played by Associations in the settlement of the difficult questions which lie ahead, and express the opinion that it is, indeed, only by the establishment in each trade of organizations representative of employers and workpeople respectively, that the object can be achieved. While agreements in the fullest sense can only be made between organizations representing each side, it is, they say, almost impossible to provide security for such agreements if any appreciable portion of workpeople on the one side, or manufacturers on the other, are not members of their respective organizations, and are consequently not bound by the agreements. In the opinion of the Federation, this point is so important that they suggest that the Government ought to go far to recognize, and give an official standing to, organizations representative of employers and workpeople respectively, and to encourage the development of such organizations. At the same time, there should be no suggestion whatever of Government pressure or coercion—each trade being free to build-up its own organization voluntarily, and on lines best suited to its peculiar needs. The idea of the Federation is that the basis of the scheme should be that each trade or section of an industry should form a council of masters and men, for discussing questions peculiar to the trade; but that there should also be superior bodies consisting (1) of representatives of employers and employed in each group of trades forming an industry, and (2) of representatives of the employers and employed in all industries.

Coal and Coke Exports.

It will be within recollection that the long unbroken war time record of monthly reduction in the quantity of coal, coke, and patent fuel exported was interrupted in June, when there were sent abroad some 162,113 tons in excess of June, 1916. But July has more than counterbalanced this; for the 3,395,365 tons exported in the month is less than in July last year by 178,772 tons, and 336,567 tons less than July, 1915. The value of the quantity exported last month was £4,600,344, which was more than in July, 1915, by no less a sum (though the quantity was lower last month by the figure already mentioned) than £1,358,693, but less than July last year by £224,608. At the same time, the average value per ton was £1 7s. 1d., compared with £1 6s. 8d. in July last year. In the seven months of this year, 22,856,736 tons have been sent abroad; or a reduction on the corresponding period of 1915 of 4,252,370 tons, and upon the same period of 1916 of 1,222,088 tons. For the 22,856,736 tons exported the last seven months, the value was £30,462,891; for the 27,109,106 tons exported in the corresponding period of 1915, £21,982,709; and for the 24,078,824 tons sent from these shores in the same period of 1916, £28,128,113.

Presentation to Mr. James Macleod.—On leaving Greenock (to take up his important position with Messrs. Brotherton & Co., at Glasgow), Mr. James Macleod was presented by the employees at the Inchgreen Gas-Works with a pair of silver candelabra, as proof of the high esteem in which he was held by the staff. Bailie Paterson, the Convener of the Gas Committee, made the presentation; and the opportunity was taken to introduce the newly-appointed Engineer and Manager, Mr. George Keillor.

PERSONAL.

The appointment of Manager of the Seaford Gas Company has been secured by Mr. A. W. Grey, who is at present Chief Assistant to Mr. Frank Livesey at Maidstone.

Mr. James Simpson, J.P., the Chairman of the Hebden Bridge and Mytholmroyd Gas Board, has recently undergone a very trying experience, for a man within a little of completing three score years and ten. Last Tuesday he had an arm removed in the hope of stemming a growth. It is gratifying to learn that he is making good progress. Forty years ago he had a leg taken off under similar circumstances.

Mr. H. J. Carpenter, the Assistant Engineer and Manager to the Doncaster Corporation Gas Department, has been appointed to a like position with the Peterborough Gas Company. He was for some years with the Harrow and Stanmore Gas Company, as Engineering and Works Assistant, previous to which he was with Messrs. Corbet Woodall & Son. He commenced his engineering training with Messrs. S. Cutler & Sons. Mr. Carpenter holds certificates in "Gas Manufacture" and "Gas Distribution" (First Class Honours), and in other engineering subjects.

A long first list was published as a supplement to the "London Gazette" on Friday of those who have been admitted by the King to the two new Orders—the British Empire and the Companions of Honour—instituted by His Majesty for the special purpose of recognizing services in connection with the war. In the Order of the British Empire, the first two classes will carry the honour of knighthood and the title of Dame in the case of men and women respectively. The Order of the Companions of Honour carries with it no title. This Order will be closely restricted in numbers; and it consists of but one class. In the first class of the British Empire Order—Knights Grand Cross of the British Empire—is included the name of Lord Moulton, K.C.B., F.R.S., Director-General of Explosive Supplies in the Ministry of Munitions, and President this year of the Institution of Gas Engineers. One of Knights Commander of the British Empire is Mr. Dugald Clerk, D.Sc. (a Past President of the Society of British Gas Industries), a member of the Panel of Board of Invention and Research, Admiralty, a member of the Ministry of Munitions Inventions Department, and a member of the Trench Warfare Advisory Panel; and another is Mr. Richard Threlfall, F.R.S., a member of the Advisory Council of Industrial and Scientific Research.

OBITUARY.

Mr. Andrew Napier, who was for forty years Gas Manager at Crieff, N.B., died last Thursday morning at the Gas-Works House, Crieff. His son (Mr. J. W. Napier) is the Engineer and Manager of the Alloa Corporation Gas and Electricity Departments. The deceased gentleman was the Secretary of the West of Scotland Association of Gas Managers at the time of the amalgamation with the North British Association. The funeral was on Saturday afternoon at Crieff Cemetery.

Official notification has been received by Mr. Walter T. Layton, the Editor of the "Co-Partnership Journal of the South Metropolitan Gas Company," that his son, Rifleman Eric William Layton, 1/21st County of London Regiment, who had been reported missing since Sept. 15 last, must now be presumed to have been killed in action on that day. He was born at Bromsgrove in 1889, and since 1910 had been on the show-room staff of the South Metropolitan Gas Company. On the outbreak of the war, he was one of the first to respond to the country's call—joining the First Surrey Rifles in August, 1914.

Blackburn has suffered a great loss through the death, at Harrogate, last Tuesday, of the Mayor, Alderman Alfred Nuttall, J.P., who had been in failing health for some time past. He first entered public life in 1893, when just over 30 years of age; and in 1913 he was elected to the aldermanic bench. He rendered excellent service to the town by his membership of various committees; particular interest being taken by him in the Gas Committee, of which he was elected Chairman in November, 1914. To the work of this Committee, indeed, Alderman Nuttall devoted a great deal of time and energy; and under his chairmanship the whole undertaking has been reorganized. The officials keenly feel the loss that both they and the undertaking have sustained. Thoroughness was Alderman Nuttall's inspiring motive; and he was at all times very appreciative of the work of the staff of the department. Apart from his municipal interests, he exercised a guiding influence in connection with many local institutions and organizations.

Information has been received by Mr. Edward Pilbrow, of the Gas Light and Coke Company, of the death in action, on the 15th inst., of his second son, Private Stanley Edward Pilbrow, who, after taking part in several battles with the 16th Middlesex (Public Schools Battalion), transferred into the Royal Flying Corps as an observer. His last flight was one in which the British machines were greatly outnumbered; but in spite of the fact that he had been wounded, he still continued to stand by his gun, until he was hit again through the head, and instantaneously killed. The machine was riddled with bullets. Lieutenant G. M. Prynne, writing to Mrs. Pilbrow, remarks that "no one can say enough for

the bravery and splendid behaviour of Pilbrow," who on all occasions "proved himself one of the stoutest-hearted and best men we had." Up to the time of his death, he had the credit of bringing down four Hun machines. Had he lived, he would have been 26 years of age next month. Mr. Edward Pilbrow's eldest son, Lieutenant H. E. Pilbrow, R.F.C., is at present home on sick leave, having been invalided from France five months ago.

There passed away last Tuesday, at his residence near Wigan, at the age of fifty-one, Mr. Frank E. Moss, and the funeral took place on Saturday at the Orrell Congregational Church. He leaves a widow and son and daughter. Mr. William Batt, the Secretary of the Northern Star Lodge, No. 3053, sends the following kindly appreciation of the deceased: "W.Bro. Moss was Provincial Junior Grand Deacon for West Lancashire, having been invested as recently as June 4 at the Provincial Grand Lodge held at Preston. He was a member of the Northern Star Lodge; and at the funeral there was a very large gathering of his personal friends and Masonic brethren to pay their last respects to his memory. The late W.Bro. Moss had been associated with the coal industry all his life. He was a colliery proprietor as well as a colliery agent, having his offices at Wigan. He was a man of great and attractive personality, and was known to almost everyone in gas engineering and colliery circles in Lancashire, Yorkshire, and the Midlands. He was a man who entered into everything—whether associated with business, social, or masonic matters—with the greatest enthusiasm. The principles he professed, he lived up to; and they seemed to inspire every action of his daily life. He was a member of several Masonic Lodges in the Wigan district; and although not a founder of the Northern Star Lodge, he became a joining member on Feb. 24, 1905 (the first meeting after the Lodge was consecrated), since which time he has been one of its most active and loyal supporters. He was a man of strict integrity and high principles, and greatly beloved by a large circle of friends, by whom he will be greatly missed."

From an Old Manuscript Diary.

Reading the other day a manuscript diary written by one John Russell, an ancestor of his wife's, and a Writer to the Signet in Edinburgh, Mr. H. Percy Boulnois, M.Inst.C.E. (a former Deputy Chief Engineering Inspector to the Local Government Board) came across the appended interesting statement. As coal gas did not come into use till 1790, and this diary was written in 1749, he rightly believes the quotation will have interest for readers.

The coal mines at Whitehaven are very extraordinary. Some of the pits are 120 fathoms below the sea; damp air is very frequent there; and some very extraordinary explosions have happened by kindling this air within these few years. Mr. Carlisle Spalding, the overseer of the works (a very clever, ingenious gentleman) has contrived a method of carrying off the damp air by applying pipes to the places infected with that air, and carrying it up to the mouth of the pits, where it is set on fire and burns with a constant flame. When the flame is extinguished, the air that issues from the pipe feels cold. It is remarkable of the air that, though it is set on fire by flame, yet no sparks or heat without flame will kindle it. For this reason they have invented a method of striking light by a flint upon a steel wheel, which enables them to see to work in the places infected with this air. The air itself has no effect upon the men unless it happens to be kindled. Several experiments have been made on this air, which retains the same quality of kindling by flame when it is carried in a bladder to any distance. Mr. Spalding told me that he has often made the workers, after they have been some time in the places infected, blow into a bladder; and this air which was thus forced into the bladder from their lungs has the same quality as the other, and may be kindled by flame. This experiment has always succeeded as often as it has been tried; and it is remarkable that the air issuing from the men's lungs does not acquire the inflaming quality till the men are about an hour and a half in the place infected with the damp air, which makes it probable that it has some effect on the men's bodies, though it is unperceivable. When the air becomes unfit for breathing in, the flint gives no light, but the sparks fall from the wheel in a reddish colour, and extinguish without showing light. Lord Dalmeny, late Sir James Clerk, Thomas Miller, Lord Justice Clerk and his brother George, John Maxwell of Williamwood, and I were three hours in traversing the works below ground with Mr. Spalding.

"King's Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas" records Mr. Thomas Shirley's observations in the year 1659 of "a well and earth in Lancashire taking fire by a candle approached to it," which was the first of many similar observations in England on carburetted hydrogen—"fire damp" as it is called by the miners—a gas of nearly the same kind as that (in its crude form) now commonly employed for lighting, heating, and power.

A Munitions Council.—It has been officially announced that, owing to the great increase in the staff and duties of the Ministry of Munitions, a "Munitions Council" will be established to ensure closer organization and the employment of more economical methods in the work of the Department. The Council will consist of the Minister of Munitions, the two Parliamentary Secretaries to the Ministry, and representatives of groups of other departments. The groups of Departments and representatives include the following: Engines, Sir Arthur Duckham, K.C.B.; Explosives Supply, Sir Keith Price; and Labour, Sir Stephenson Kent, K.C.B.

MONAZITE SAND IN CEYLON.

Work of the Imperial Institute.

The mineral survey now being conducted in Ceylon in co-operation with the Imperial Institute has, we are officially informed, led to the discovery of beach deposits of monazite sand, which will usefully supplement the commercial supplies of thoria required for the manufacture of incandescent gas-mantles. Samples of the sand have been investigated by the Imperial Institute; and the results are so promising that the Government of Ceylon has arranged to work the deposits. Suitable British concentrating machinery has been selected by the Institute for the purpose—after some experimental trials, and will shortly be shipped to the colony.

This is the latest chapter in the story of the long struggle to rescue the gas-mantle industry from German domination. Formerly, as is well known, the monazite deposits in Brazil were the only commercial source of supply of thoria; and these were controlled by the German Thorium Syndicate. The Brazilian monopoly enjoyed by the Syndicate was broken by the discovery of extensive deposits of monazite in the native State of Travancore in India, so rich that samples examined by the Imperial Institute were found to contain nearly twice as much thoria as the Brazilian monazite. The German Syndicate, however, obtained control of the Company formed to work the Indian deposits; and they continued to exercise a dominating influence over the industry till the outbreak of the war. Since then the Company has been reconstructed and given a British character; and it is understood that another portion of the deposits in Travancore has been taken up and will be worked by a second British Company.

It is of interest to note that the work of the mineral survey has shown that Ceylon can furnish several other thoria minerals besides monazite. Among these is thorianite—the richest known source of thoria. This new mineral when it first came on the market was sold in this country at as high a rate as £1600 per ton; but the deposits have proved to be limited.

ELECTRICITY SUPPLY MEMORANDA.

While the Board of Trade Electric Power Supply Committee are sitting, the second report of the Committee for the interlinking of Lancashire and Cheshire electricity systems (of which Committee Mr. S. L. Pearce, of Manchester, is Chairman) has been issued. The first report appeared last autumn. The present one goes in detail into the scheme then presented; and it evidences very careful thought and preparation, which is no guarantee that it will be acceptable to all the undertakings concerned, nor that it will fit in with the views of the Board of Trade Committee, whose hybrid composition has already been brought into disparaging contrast with this technical Committee dealing with Lancashire and Cheshire. The fundamental principle adopted by the Committee is that interconnection of existing interests is the first step that should be taken in electrical reorganization with the view of obtaining an adequate, cheap, and reliable supply of electrical energy for industrial and other purposes. In view of the immense capital expenditure involved in the existing concerns, this appears to be an eminently sage course. The report is of considerable length; and it does not graciously yield to brief review. However, regarding the construction of the proposed Joint Board, the Committee suggest that every authorized distributor (there are in all 35 concerned) should be entitled to representation upon the Joint Board; so that the total membership would be 90, subject to extension by the advent of other eligible undertakings. In the case of local authorities, the basis of representation, it is thought, should be population of the area supplied; in the case of companies, capital outlay should be the basis. From the Joint Board, District Boards should be elected; and from these a Central Executive of twenty members. As to the powers of the Joint Board, it is suggested that they should co-ordinate and prescribe the running hours of the existing generating stations in such a way as to yield the most economical operating conditions; should also determine the bases of charges for bulk, stand-by, emergency, and reciprocal supplies—a complicated problem upon which the Committee give some indication as to their views; should deal with and allocate charges incurred in carrying out the schemes, together with the Board's administrative expenses; and should act in an advisory capacity in reference to future extensions, linking-up, &c. Other suggestions deal with the working arrangements between power companies and others, the appointment of officials, the investing of the Joint Board with compulsory authority to obtain wayleaves for mains and overhead lines, to lay mains in undedicated streets, and to erect overhead lines crossing public roads. Among other proposals, it is seen that, in the event of it being shown to the satisfaction of the Joint Board that any undertaking has been adversely affected financially by the operation of the above powers, it shall be incumbent upon the Board to allocate the charges between the participating authorities so as to reimburse the undertaking affected. The report proceeds to deal with the delegation of powers to District Boards and Executive Committee. Should

Interlinking.

any dispute arise between any undertaking and the District Board or between a District Board and the Joint Board, the matter, it is suggested, should be referred to the proper Government tribunal for a decision. The scheme is a far-reaching one ; the duties and work involved are of a complex order; the seats for dispute and disaffection many; and, if consummated, it would be a remarkable thing if the Government tribunal to whom disputes would have to be submitted were not kept busy, in view of hitherto free local administration being brought largely under the subjection of an external body in the manner proposed.

Requisite Cooker Maintenance.

The Electric Lighting Committee of the Marylebone Borough Council regard a communication they have received as a great compliment. So do we—to the circumspection of their technical staff. The communication was from Messrs. J. Heywood & Sons; and it expressed "their appreciation of the services rendered by the sales department in maintaining the cooking apparatus for supplying the school and the men of the Royal Flying Corps at the Polytechnic in such a high state of efficiency, and thereby enabling the management to fulfil its obligations." From this it appears clear that had not this earnest and close attention to the maintenance of the electric cooking appliances been given, the firm would not have been able to fulfil their obligations. This demand for constant nursing is peculiar to the electrical type of cooking apparatus, and more especially to that of large capacity. The smaller representatives also beg for a fair amount of consideration; and, though accorded, many users have been mightily glad when they could root out their error, and welcome the superseding gas-stove. The Marylebone Electricity Department was one of the first to see the wisdom of endeavouring to keep electric-cooking appliances in order by frequent inspection and prompt repairing measures, which policy tells of a marked tendency to go astray, and to produce disaster.

Electricity at "Economy" Hall.

But we must give the Marylebone Electricity Department credit for showing a large amount of enterprise in connection with this subject of electric cooking. Whether the enterprise has always been directly profitable to the department one does not know; but whatever has been taken in hand has been a good advertisement, if nothing else. At No. 316, Regent Street, is "Economy Hall." It used some years ago to be the famous Russell Club. But now the premises have been acquired by the British College of Cookery and Domestic Economy. The school is said to be managed by an Advisory Committee, of which the Right Hon. Lord Leigh is the Chairman. We cannot recollect that it has ever been brought to our notice that the noble Lord has any particular qualifications for being Chairman of an Advisory Committee for a "College of Cookery and Domestic Economy." And we have not the slightest doubt that the principal of the College, Miss Matilda Lees-Dods, could give his Lordship a great deal more advice on the subjects than his Lordship is able to dispense. But let that pass for the moment. The college is within the district of the Marylebone Borough Council Electricity Department; and the direct current mains of the concern are delivering energy to the college for cooking purposes. It seems, according to the "Electrical Times," that the Committee, "realizing that electric cooking would in the end become universal, decided to instal several electric cookers for a start." The "several" consists of two which have been connected-up, and two additional ones are on order. The fact that the Committee, with Lord Leigh at its head, have "realized that electric cooking would in the end become universal," shows the incompetence of the Committee for forming judgment on such a matter. The Committee should study the questions of fuel economy, thermal values, and other points upon which it may be concluded that Lord Leigh and his Committee associates require a little enlightenment, so as to put them in a better position to judge of the likelihood of the possible universality of electric cooking, and of it having any durable or large part in this direction in the world's progress in economy. Being on the mains of the Marylebone Electricity Department, we may be sure that all electrical expert attention required for keeping the cookers in repair, and (as far as possible) free from failure, will be expended upon them. It is hoped by our contemporary that the undertaking will prove a sound commercial success, in which connection we wonder how much per unit Marylebone is charging for the current used at the college, and whether any part of the cost of providing the supply will go down into the accounts of the publicity or sales developing department.

The "Gas Controller" the Enemy's Friend.

"Meteor" of the "Electrical Times" opened his mouth and swallowed in every particular the recent statement of the "Evening News" that the authorities had in mind the appointment of a Gas Controller. By the time "Meteor" had penned a paragraph on the subject, the singular statement had been made not in one paper, but in a number of "evening papers." Rumour has a knack of expanding hyperbolically; and it suits "Meteor's" book where gas is concerned. The authorities in Whitehall and elsewhere interested in the question of the maintenance of high explosives and fuel oils would probably, if it were worth while, and any real harm had been done, have been only too pleased to have made close inquiry as to the source of the information of our evening contemporary. To do anything to diminish the flow of materials essential to the war is something which "D.O.R.A." will not stand. However, our friend attributes to the Board of Trade the proposal to appoint a Gas Controller. The Board of Trade are likely to consult the Ministry of Munitions, the War Office, and the Admiralty before they did anything so rash as to attempt to diminish the consumption of gas in present circumstances. The Coal Controller is working hard to see that gas undertakings are supplied with coal, in order that there may not be a shortage of a single gallon of any liquid or other product required by our Army or Navy; and it is the patriotic duty of householders and manufacturers to use gas instead of solid fuel or other agents which do not contribute to war essentials. There may be pacifists and other conscientious objectors. "Meteor" points out that the pacifists are in a predicament. If they save coal or if they consume gas, they are assisting to win the war and defeat their German friends. Every consumer the electrical industry entices away from the gas industry at the present juncture is an assistance to the enemy; so that those electricity managers and salesmen responsible for such enticement are worse than the avowed pacifists. It is not a gas controller that is wanted, but an electricity controller; seeing that every unit of electricity consumed in this country, taking the average consumption of coal per unit, means an expenditure of about 67,500 B.Th.U. to obtain 3420 B.Th.U. And nothing in the way of high explosives, tar oils, or other useful things of which the enemy devoutly wishes we had not such a plentiful supply, helps to compensate for that deplorable waste of thermal energy.

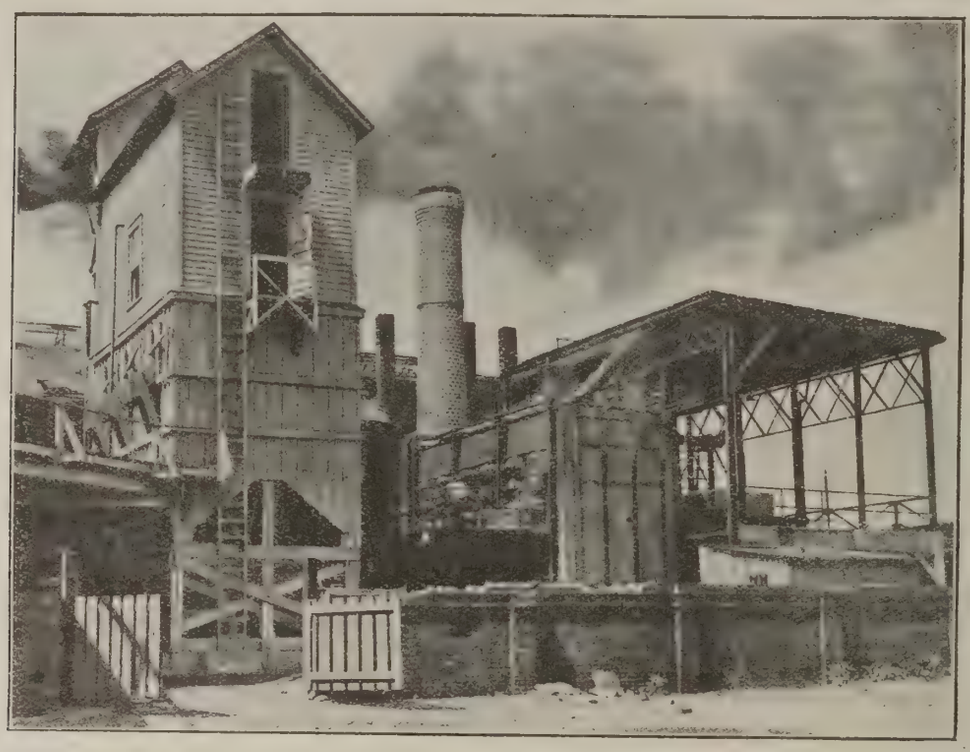
A Bye-Product Steam Boiler.

Mr. George Wilkinson, the Electrical Engineer of Harrogate, is desirous of removing this blemish of uneconomy from the working of electricity stations. He has a little scheme whereby he proposes to convert electricity stations into miniature gas-works, by distilling coal, washing the gas for the products, and economizing heat by discharging the incandescent coke and burning the washed gas under the boilers. It is a question whether a small carbonizing plant of the kind can be made to pay. Mr. E. W. L. Nicol not long since propounded a scheme whereby he proposed to place electricity generating plant at gas-works, where incandescent coke is available for steam raising, and the gas is washed of certain much-required products. However, Mr. Wilkinson convinced his Committee that his adaptation is a perfectly sound one—not that we suppose any of the members are really cognizant of the technics of coal carbonization, the chemical treatment of the products, and the raising of steam by incandescent coke and gas. Anyway, they sanctioned an application to the Local Government Board for £4710; and the Ministry of Munitions, it is said, pronounced it "an important advance on the present system." But they seem to have done this without seeing the plant in operation. Being wishful of inspecting it at work, so it is further stated, the Ministry have granted permission for the expenditure of an extra £1710 required to meet the proposed outlay of capital. That is to say, if we are to believe the newspaper report, the Ministry have pronounced judgment on the proposal before witnessing its operation. The local newspaper also states that just now the bye-products are especially valuable for the making of explosives. We do not think that the single boiler installation upon which, if the Local Government Board give their consent, Mr. Wilkinson is intending to spend the money mentioned will go far in supplementing the explosives required in the war. Their value to the extent of production will depend on the temperature of carbonization. It is also announced that the Board of Fuel Research are interesting themselves in the scheme. It may assist in convincing the Board that the question of electricity generation belongs to the larger one of fuel economy, with which is involved the cheapest method of carbonizing coal and dealing with and distributing the various products from the source of carbonization. Although gas-works have been doing for many decades much the same thing, only on a larger scale, as Mr. Wilkinson now proposes to do in the matter of coal carbonization, the realization of primary and secondary products, and the use of smokeless fuel under steam-boilers, the Harrogate paper applauds the scheme from the local and national point of view, and as an innovation. The innovation rather consists of adaptation to electricity generation; and it does not appear to be a very distant relation of the bye-product gas-producer. There is hope that the local baths and hotels with laundries attached will adopt the system. Mr. Wilkinson is obviously against the doctrine of economy in concentration; but then he has a smokeless combustion steam-boiler plant that he wishes (from, of course, purely disinterested motives) to see make its way in the world.

Evening Star Lodge.—This day forty years ago (on Aug. 28, 1877) the Evening Star Lodge, No. 1719, was consecrated at the Freemasons' Hall, London. All the founders of the lodge have since died; but twenty-two of those who have occupied the position of Master are still living. The name of one brother who joined during the first year—Bro. Samuel Cutler—is in the list of present subscribing members; while of those who were initiated the following year, there still remain Bro. T. H. Martin, formerly of Barnet, and Bro. John West.

AN OPEN CONSTRUCTION OF CARBONIZING PLANT AT MACON, U.S.A.

Suitable for Warm Climates.

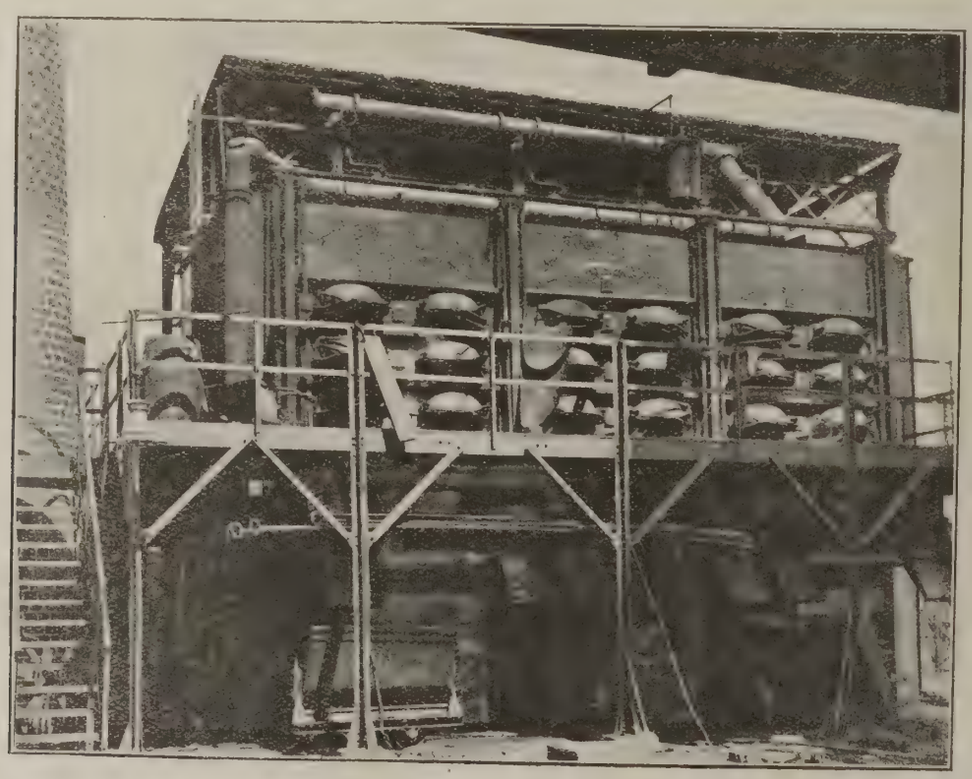


GENERAL VIEW OF THE NEW PLANT AT MACON.

A first installation of carbonizing plant erected at Macon (Ga.), and described in the New York "Gas Age," includes several novel features, the chief of which is the absence of a retort-house. The retort-bench, with its accessories, stands in the open; the only protection being a light roof carried on columns in the front, and covering the charging floor. The top of the bench is rendered rain-proof by a slab of reinforced concrete, sloping towards the discharge side, and carrying the usual guttering, &c. Three beds of sixes, with full-depth regenerator furnaces, are completed, and a similar bench is in progress.

The retorts are built in silica sections with fire-clay heads, and supported by silica setting blocks. The section is 16 in. × 26½ in., and the length 11 ft. 5 in., with mouthpieces at each end. The furnaces project 3 ft. 1 in. in front of the setting and carry large charging doors set in the floor. The recuperators are specially designed to ensure a good heat distribution. A tunnel flue in the foundation leads to a chimney at one end, and the primary air is injected by steam through a heating chamber in the rear of the furnace. The benches have Congdon stand-pipes and wash-boxes. There is a hand travelling pusher to eject the coke, a foul main, tar seprator, and coke conveying and screening plant.

Both the charging and discharging floors are supported on steel columns and girders, and are respectively constructed of reinforced concrete with a vitrified brick working surface, some 10 ft. above the yard level, and a cast-iron grating. The columns are encased in concrete up to the floor level. Charging and drawing is done by hand. Buggies are used for conveying coal; and the hand pusher travels on 7 in. girders spaced 8 ft. apart. The ram has a 15 ft. travel, is worked with a crank and gearing, and is much easier for the men than the usual process of drawing the charge. On the discharge side, a light shoot, built of steel slats, is fixed immediately beneath each column of mouthpieces, by which the coke is guided into side-tip trucks, 6 ft. × 3 ft. 10 in. × 4 ft. 8 in. high, running on a 2 ft. gauge rail system connected



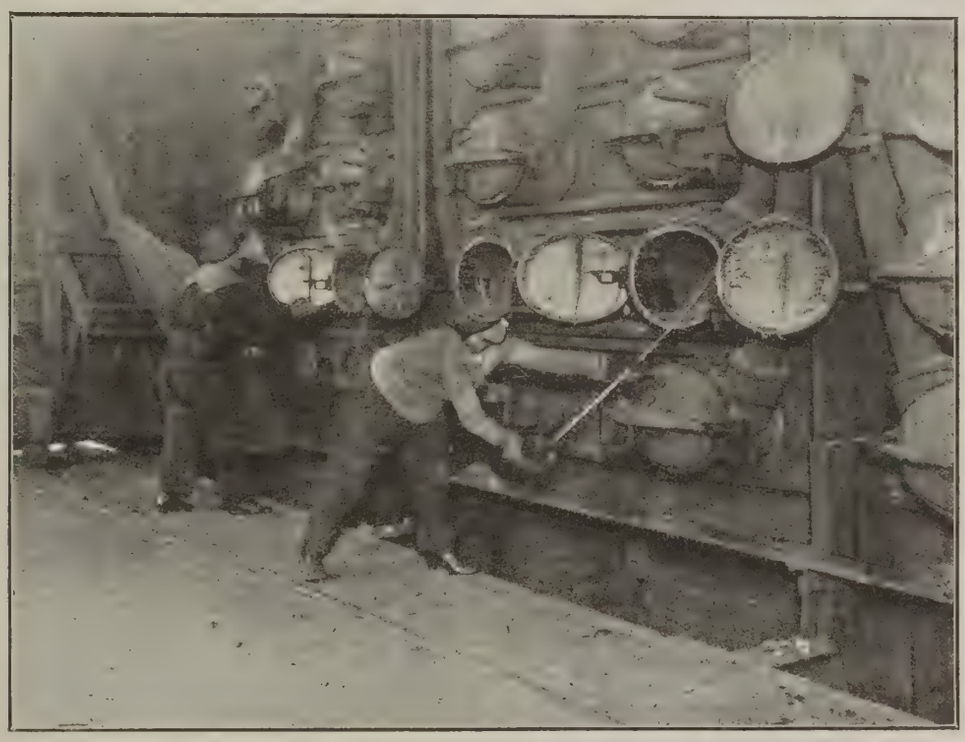
THE COKE-DISCHARGE SIDE OF THE OPEN-AIR RETORT-BENCHES AT MACON.

with the coke screen and tip. A water-spray over each shoot does the quenching, and water can be added to the car-load.

About 16 ft. from the discharge side is the coke screening tower, a wooden structure 12 ft. × 22 ft. × 42 ft. 4 in. high from the yard level to the ridge of the roof, connected to the stage floors by an overhead run-way. It contains a steam hydraulic elevator, with platform 6 ft. × 8 ft., on to which the trucks can be wheeled direct from the retort-bench, and either raised to a 12 ft. level connected with an elevated track leading to the coke tip, or to a 33 ft. level, where they can be emptied over the screen (which is a shaker), operated by a 7½ H.P. electric motor, and sorted into three sizes. They are delivered into a receiving bin built of 2 in. oak with two partitions, each compartment having two discharging gates with hinged spouts for loading wagons on the yard level, also a spout for loading into trucks on the elevated siding.

The Congdon stand-pipes are rectangular steel columns, two to each bed, each serving three retorts; and the mouthpiece connections are fitted with disc valves. They open at the top into steel wash-boxes, one to each bed, with adjustments for working either with no seal or any desired depth. The bottom ends are also open, and sealed in a tar-trough, into which the excess liquid from the wash-boxes also drains. The mixed liquids pass on to a separator tank fitted with baffle-plates. A 2½-in. centrifugal pump raises liquor from the wash-boxes to supply a spray that plays down each stand-pipe. Connections, 8 in. diameter, lead from each wash-box to a 12-in. foul main. This arrangement successfully avoids stand-pipe troubles.

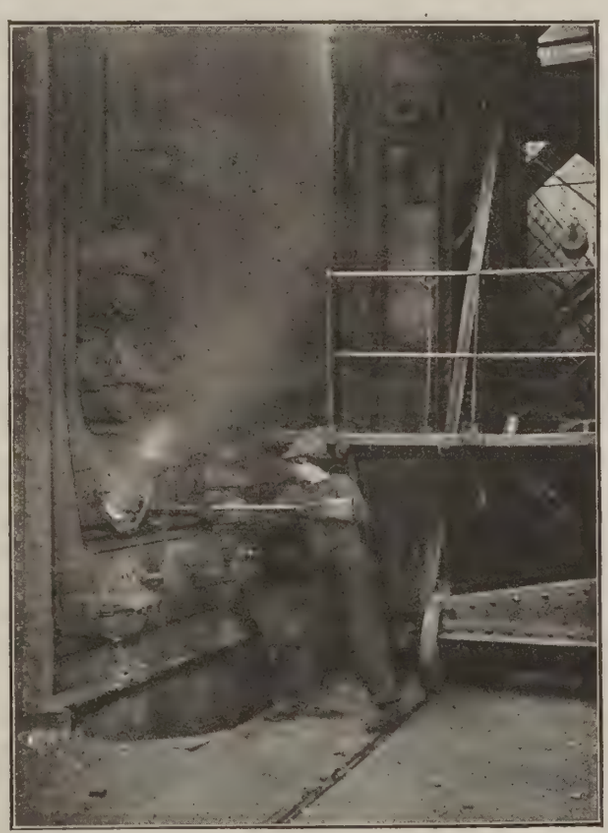
WOMEN WORKERS OF THE SOUTH METROPOLITAN GAS COMPANY.



WOMEN AT THE VAUXHALL WORKS CLEARING RETORT-LIDS AND ASCENSION PIPES.

In the course of his remarks when presiding at the recent half-yearly meeting of the South Metropolitan Gas Company, Mr. Charles Carpenter, D.Sc., referred to the enormous help which women have been to them in their present difficulties, and stated that the retort-house work in a portion of one of the Company's large stations is now being carried out entirely by female labour. The Chairman's warm tribute to the zeal and earnestness displayed by the women lends special interest to the accompanying photographs, which he has since forwarded. These were, he points out, taken by flash-light; and consequently, though they may not be good pictures, they are accurate representations.

GIRL CLEARING AN ASCENSION PIPE.



GIRL BACKING-UP A RETORT, AFTER THE COAL HAS BEEN CHARGED.

The copyright in the above photographs [which are the work of the Sport and General Press Agency, Ltd.] is retained by the South Metropolitan Gas Company.

THE "DIRECT" PROCESS FOR THE MANUFACTURE OF SULPHATE OF AMMONIA.

From the Annual Report of Mr. W. S. Curphey, the Chief Alkali Inspector.

The following portion concludes the section of the report for 1916 of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, 1906, which deals with the further study of the "direct" process for sulphate making in gas-works. The earlier parts will be found in the last two issues of the "Journal" [pp. 281, 322].

Works "G."

During the past year, plant has been under close observation, and Mr. C. A. W. Codgbrook, the Manager, has been most assiduous in his endeavour to perfect its working, to obviate loss of ammonia, and collect reliable data for the use of the Department. Attention at these works has been directed more particularly to improve the working of the "bubbler," and to the control of the rotary washer which supplies ammonia to the purifiers. In addition, the purifiers have been cased from the weather, provided with temperature tubes, and their working controlled by means of thermometers.

The earlier history of the works was given in the report for 1915.

Description of Plant.

Coal.—South Yorkshire, screened nuts:
Maximum average coal used per 24 hours, December, 1916, 13 tons.
Minimum average coal used per 24 hours, July, 1916, 6½ tons.

Gas.—Maximum average make, 150,000 c.ft. per 24 hours.
Minimum average make, 75,000 c.ft. per 24 hours.
} About 11,500 c.ft. per ton.

Purifiers.—Four, each 12 ft. square, with three layers of oxide, 7 in. deep.
Area of each purifier, 144 sq. ft.
Total volume of oxide (four purifiers), 1008 c ft.
Volume of gas passed per 24 hours per square foot superficies:
Maximum make, 1040 c.ft. (1259 c.ft. on Dec. 22, 1916).
Minimum make, 520 c.ft.
Volume of oxide per 1000 c.ft. of gas passed per 24 hours:
Maximum make, 6 7 c.ft. (5·6 on Dec. 22, 1916).
Minimum make, 13·5 c.ft.

The purifiers are in the open, and much exposed. They are placed in a shallow pit, with two grids above, and one grid below the ground level. The lower portion, with the connecting mains, is reached by raising the plank flooring at the side. The boxes are worked in sequence with upward flow of gas, and the first box is emptied when a foul test is obtained at the exit of the second.

Oxide.—Artificial oxide and bog ore were in alternate use up to December, 1916, when the material was fully spent. A supply of fresh bog ore (56 p.ct. moisture) was then obtained, and brought into immediate use with half its weight of spent oxide. Revivification is carried out on the floor of a shed. When first visited, in January, 1916, the shed was open at the sides, and the oxide much exposed to driving rain. In the spring, the sides of the shed on the north and west were boarded in, with great benefit to the oxide.

Acid Bubbler.—This is 4 ft. square by 4 ft. high, with the usual effluent tank and lead box for the circulation of liquor. The "bubbler" also receives ammonia from an intermittent still fed with virgin liquor.

Rotary Washer.—Of the Holmes type, with eight compartments, 4 ft. diameter, total working capacity 325 gallons. The washer is fed with ammoniacal liquor. In November, 1916, the liquor in the last four sections of the rotary was replaced by "Solvene" for the removal of naphthalene, which became a source of trouble as soon as the Livesey tar-extractor was put into operation for the extraction of toluol. The coal gas, after leaving the rotary, passes by an underground main (12 yards) to the purifiers.

Virgin Liquor Still.—Of intermittent type. The lower compartment of the still is charged with milk-of-lime. Liquor is then run down the still and the mixture is steamed to expel the "fixed" ammonia.

Working of Plant.

As originally worked, this plant had certain defects which seriously minimized its efficiency. Virgin liquor was distilled from store at maximum speed during the day time, and the hot ammoniacal vapours, imperfectly cooled by the Liebig, overpowered the acid liquor in the bubbler, and the effluent on occasions was alkaline, while the heavier liquor below remained highly charged with acid in spite of continuous and active circulation. This unfortunate condition of things was aggravated by the procedure, then adopted here as at several other works, of continuing the still in operation when the acidity of the liquor was at a minimum just prior to removal for evaporation. Under these conditions, the coal gas left the bubbler at a high temperature, heavily charged with moisture, and with amounts of ammonia varying from 6 to 140 grains per 100 c.ft. (Table C). The effect on the purifiers was disastrous—periods of disorganization were frequent, and the oxide was reduced to mud.

To remedy this state of affairs, the Holmes washer was brought into use. The first effect was unfortunate—a large part of the ammonia that formerly passed the bubbler and helped to counteract the evil effect of the moisture in the purifiers was absorbed in the washer and returned to the virgin liquor well. Attention was thereupon directed to the oxide. The sides of the revivifying shed were boarded-in and the floor drained. With drier oxide, conditions improved; and with the lessened make of gas and warmer weather the amount of gas passed rose from under 1 million to over 3½ million cubic feet, with the ammonia contents of the gas at a minimum—and this with oxide fully spent.

It was clear, however, that, with the approach of winter, purifier troubles would recur as soon as the new stock of wet oxide was brought into use. Steps were therefore at once taken to amend the defective working of the plant. The ideal aimed at was to regulate the flow of liquor to the still and to adjust the milk-of-lime feed by test; to ensure complete absorption of ammonia in the "bubbler" under all conditions of work, and to add a controlled amount of ammonia at the rotary; to screen the purifiers from the cold and regulate their temperature by means of steam pipes placed below the bottom grids; and, lastly, to reduce the moisture content of the oxide to a minimum. The working of the plant was successfully remodelled; but in spite of every effort, the ill-effects due to the use of fresh wet oxide, though lessened, could not be obviated. Relief was only finally obtained by bringing into use some old and partially spent bog ore (30 p.ct. sulphur) that remained on the works. It is of the utmost significance that with this drier and matured material, and with the improved system of working, the amount of gas passed rose from 470,000 c.ft. (Experiment No. III., Table D) to nearly 4½ million cubic feet (Experiment No. IV.) under the worst possible climatic conditions and with a winter make of gas. The matter is further discussed below.

Working of the Plant in Detail.

Virgin Liquor Still.—Test of the effluent liquor showed that on occasions serious loss of "free" and "fixed" ammonia was taking place; the still was overtaxed and milk-of-lime added with little regard to the volume of liquor charged, thus: Virgin Liquor Feed.—"Free" ammonia, 1·040; "fixed," 0 880; total, 1·920. Effluent Spent Liquor.—"Free" ammonia, 0·066; "fixed," 0·330; total, ·396.

A loss of 20 p.ct., equivalent to 3 lbs., of sulphate of ammonia per ton of coal carbonized.

With increased lime-feed and more careful steaming: The effluent spent liquor showed "free," 0·046; "fixed," 0·003; total, 0·049—a loss of 2½ p.ct., equivalent to ⅓ lb. of sulphate of ammonia per ton of coal.

It was then decided to charge the still periodically with the same volume of liquor and to add a fixed charge of milk-of-lime; to work the top section* of the still hot; and to increase the flow of water on the Liebig. The altered procedure was entirely successful. In place of 17 to 20 gallons of liquor per 70 minutes, 25 gallons were distilled, and loss of ammonia in the spent liquor was minimized. But the improvement was only made possible by consequential changes in the "bubbler." To cope with the extra volume of ammonia from the still, it was necessary to secure partial or complete saturation of the ammoniacal condensate from the Liebig; otherwise the effluent bubbler liquor would have been alkaline under all conditions of work. This was effected by means of a small preliminary "neutralizing box" placed in the acid liquor circuit; the ammoniacal condensate and uncondensed gases being passed through this box with the acid liquor before entering the "bubbler." Complete neutralization was in this way effected in a very simple manner and at minimum cost, as all the parts were made and fixed by local labour. The arrangements are shown diagrammatically in figs. 1 and 2.

In fig. 1, A is the neutralizing box—a lead-lined wooden box, 1 ft. square by 18 in. high. B is the usual iron seal-pot receiving ammonia gas and condensed liquor from the Liebig C. D is the usual lead box for circulating acid liquor from the bottom of the "bubbler" E, raised 2 ft. and connected with A by 1-in. pipe sealed in liquor below. From the neutralizing box A, the mixed ammoniacal and acid liquors enter the "bubbler" by the usual pipe (*a*) sealed below and uncondensed gas by the usual unsealed pipe (*b*). The pipe F delivers strong sulphuric acid direct from an overhead tank to the last compartment of the effluent liquor tank, in place of to the lead box as formerly. It is now proposed to replace the lead neutralizing box by a small cylindrical cast-iron seal pot lined with lead—one similar to the seal pot B would doubtless suffice.

Fig. 2 shows the arrangement for feeding the still with a fixed volume of liquor. A is the store-tank; B, the 25-gallon measuring tank; C, a glass gauge tube with anti-splash funnel; *a* a^1 are cocks—the former full open, the latter set to standard; *b* b^1 are lever taps—*b* fills the tank, b^1 empties it; the height of liquor h^1

* If the flow of water on the Liebig be unduly increased and the top of the still worked cold, ammonium carbonate is apt to condense in the iron seal pot and block it. With the top section kept hot, this source of trouble disappeared.

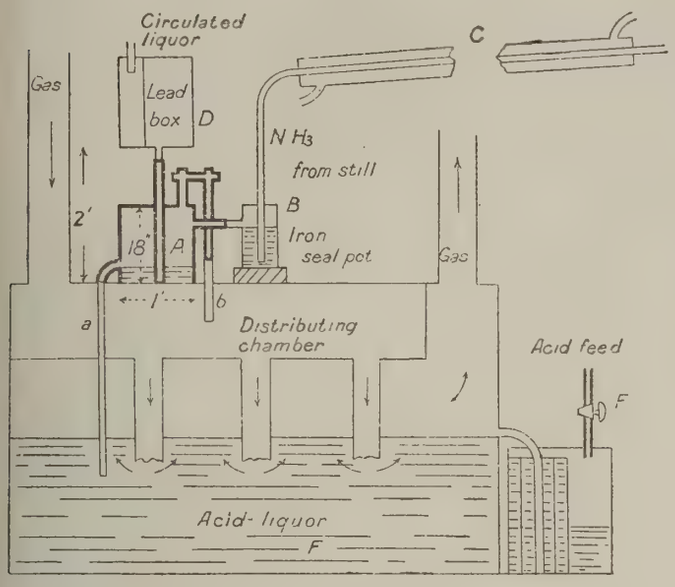
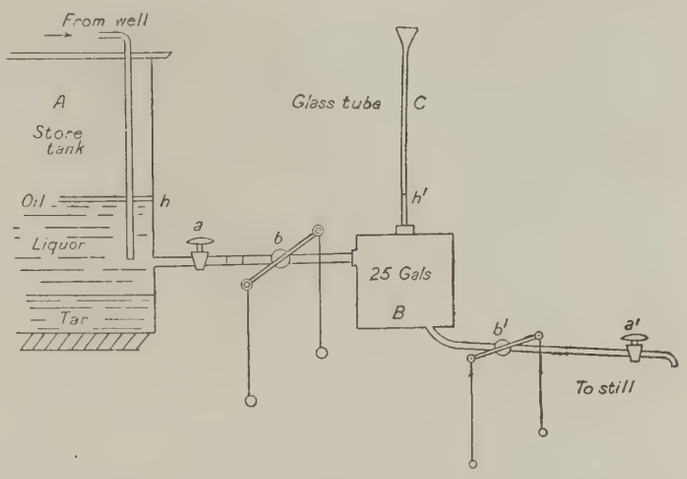


Fig. 1.—Acid "Bubbler."



A. Store Tank. *a a'* Cocks—*a* Open; *a'* Partly Open.
B. Tank, 25-gallon capacity. *b b'* Lever taps—*b* Charges the tank B; *b'* Empties it.
C. Glass gauge tube and anti-splash funnel.

Fig. 2.—Liquor Feed.

in the tube C shows the corresponding height *h* in the store tank at any given moment, and thus acts as a gauge. A layer of oil is placed on the surface of the liquor in the tank A to obviate any loss of ammonia, and oil is also used on the surface of the liquor in the well from which A is filled.

The still is stopped while liquor is being drawn from the bubbler for evaporation, or, if possible, only started in the morning after the bath has been made up by adding fresh acid.

This arrangement of plant has been in use since November, 1916, and has given entire satisfaction. By its means the amount of ammonia leaving the bubbler has been reduced to 3 grains per 100 c.ft. Formerly, tests from 13 grains upwards were usual, and the bubbler effluent is now uniformly acid.

Rotary Washer.

The function of the washer is two-fold in the direct process—it serves to condense moisture and to control the amount of ammonia passing to the purifiers. In this respect, it may be said to resemble the last ammonia scrubber in the older process. Worked under ideal conditions, the washer would be kept as cool as possible and receive a regular flow of ammoniacal liquor of controlled strength—weak in summer, strong in winter. Unfortunately, the working conditions are far from ideal—the requirements of the purifiers vary according to the condition of the oxide, and the tension of ammoniacal liquor cannot be controlled at will when the only liquor available is virgin liquor of low strength; and in the winter, when purifiers need most ammonia, the rotary is least willing to part with it. It is desirable, therefore, to have a bye-pass in reserve. This should be arranged to deliver crude gas beyond the rotary; otherwise much of the ammonia supplied is removed by the washer and returned to the well. At "Works G," the only available bye-pass is a 2-in. pipe from the inlet to the exit of the rotary; and there is no secondary source of supply to the second purifier, as at "Works E."

The results are presented in Table C. It will be seen that the average amount of moisture condensed per twenty-four hours (by calculation) is 3·8 gallons per 100,000 c.ft. of coal gas, or nearly 2½ cwt. per week; the average reduction of temperature being 5·7° C. (10° Fahr.). The effect of the rotary in removing excess of ammonia from the gas above that required in the purifiers is illustrated by Experiment No. 2 (Table C), where an inlet test of 142 grains per 100 c.ft. of gas was reduced to 34 grains at the outlet. In Experiment No. 5, on the other hand, an inlet test of 6 grains was raised to 11 grains at the exit. Experiment No. 7 shows the neutralizing effect of the rotary on the 2-in. bye-pass—68 grains reduced to 16 grains.

It is evident that to work a rotary successfully, one should have at command a table showing the ammonia content of gas grains per 100 c.ft.) for liquor of varying temperature and strength. The preparation of such a table would be well worth the attention of a gas-works chemist, and would afford a useful guide in scrubber practice. Coal gas might be passed through liquor of known strength at various temperatures, and the volatilized ammonia be caught and determined.

Working of Purifiers.

This has been characterized by extreme irregularity. A supply of fresh bog ore, ordered for the summer, was only delivered in the late autumn, and had to be put into immediate use with 56 p.ct. of moisture, and at a time when the make of gas was approaching its maximum. The precaution was taken of mixing the bog ore with half its weight of dry partially spent artificial oxide and raising the temperature of the boxes by means of steam, and ammonia was freely supplied by means of the bye-pass. But

Table C.—*Effect of Rotary Washer on Ammonia Content of Coal Gas.*

Experiment. No.	Acid Bubbler. Sulphuric Acid. (H_2SO_4) per 100 Parts. Bottom Layer.	Acid Bubbler. Sulphuric Acid. (H_2SO_4) per 100 Parts. Top Layer.	Holmes Rotary Washer. 4 ft. Diam., 8 Sections, 325 Gallons of Liquor. Virgin Liquor Feed. Gallons per 24 Hours.	Virgin Liquor Feed. Free Ammonia. Parts per 100.	Free Ammonia. Parts per 100. First Section. Where Gas Enters.	Free Ammonia. Parts per 100. Last Section. Where Gas Leaves.	Crude Coal Gas Entering and Leaving Washer. Volume. Cubic Feet per 24 Hours.	Temperature °C. Inlet.	Temperature °C. Exit.	Ammonia. Grains per 100 C. Ft. Inlet.	Ammonia. Grains per 100 C. Ft. Exit.	Remarks.
1	..	..	55	1·05	0·91	0·97	79,000	25·0	22·0	13	39	1½-in. bye-pass closed.
2	14·8	Alkaline (equiv. to 0·1 p.ct. H_2SO_4).	60	1.04	1·18	0·98	65,000	25·0	20·0	142	34	" " "
3	..	1·3	50	1·03	0·65	..	90,000	24·0	19·0	29	27	" " "
4	..	0·8	50	1·03	0·86	..	82,000	23·0	16·5	14	26	" " "
5	..	Acid	*Nil*	0·95	0·22	0·32	87,000	25·0	20·5	6	11	" " "
6	..	2·2	*Nil*	..	0·48	0·90	131,000	16·0	8·0	3	6	1½-in. bye-pass closed. Neutralizing box in use on bubbler.
7	..	8·5	60	...	2·23	1·35	130,000	14·5	6·5	68	16	1½-in. bye-pass open. Neutralizing box in use.
						Average temperature . . .		21·8	16·1	Calculated average amount of moisture condensed per 100,000 c.ft. of gas per twenty-four hours = 3·8 gallons.		

serious disorganization followed; and until the oxide is matured and drier and the make of gas reduced, conditions will remain critical.

Undoubted benefit has resulted from the protection afforded to the sides of the purifiers from cutting wind. The management were unable to face the expense of enclosing the purifiers in a suitable shed; but relief was afforded by using the planks that covered the purifier pits to case the sides of the boxes. The planks were placed so as to form a sloping "roof" against the boxes. When a box fouls, the necessary gangway is formed for emptying and recharging by temporarily replacing the planks in position. This device has proved successful, and by means of a limited supply of steam to the pipes placed beneath the bottom grids a temperature of over 30° C. (86° Fahr.) is readily maintainable in the first two boxes. Before the change, and without the use of steam, the temperature fell to 13° C. (56° Fahr.) in the leading box, and the box had to be changed. Further, it is significant that since the purifiers were cased-in the temperature of the oxide on the top grid of the fourth box now exceeds that of the inlet gas by 8° to 9° C. (13° Fahr.)—previously by barely 1° C.

Temperature records have been carefully kept by the manager since November, 1916. In this case, thermometer tubes were inserted through the sides of the purifiers, as there is no fixed section in the lids—the ends of the tubes enter the oxide, and are plugged to prevent the escape of gas and consequential disturbance to the oxide. The curves are extremely irregular in character and difficult to analyze in the absence of complete data respecting the character of the reacting gases and the condition of the oxide. But the manager has found the records of use, and is continuing them for his own guidance. Considerations of space render it impossible to include in the report a set of curves similar to those given above for "Works E;" but it may be of interest to gas managers if the curves relating to Experiment No. IV. (Table D) are given, when the amount of gas passed was raised to 4·4 million cubic feet by careful attention to the ammonia by-pass and steam-pipes and free use of air—indeed, it was probably the failure of the steam supply at the end of the period that caused the purifiers to fail. The temperature curves are clearly affected by the steam, but show little relationship to the make of gas. The tops of the boxes were in this case protected by sheets of galvanized iron; and the top layer of the first purifier in this case is noticeably active. The fouled oxide when removed contained only 1·5 p.ct. of moisture.

In Table D, an attempt has been made to co-ordinate the data relating to periods of good and bad working. A sufficient supply of ammonia was present in all cases—good and bad—to ensure absence of "soluble salts of iron;" and the working temperature of the boxes was suitably maintained. Disorganization here, as at "Works E," was probably due to the use of fresh bog ore highly charged with moisture at a time when the make of gas was at a maximum. Compared with the results obtained at "Works E" (Table B), the rise of temperature on the middle layer of the first purifier is low; and it is probable that the very artificial means of heating the purifiers employed at these works may cause greater disturbance to the system than at "Works E."

Loss of Ammonia.

The recovery figure for 1915 was given as 17 lbs. of sulphate of ammonia per ton of coal carbonized; for 1916, it is 18½ lbs. The latter figure is much below expectations, and raises some doubt whether the amount of ammonia leaving the retorts is really as high as one has generally supposed. But stocks are difficult to measure accurately in small works, and at best the recovery figure is only approximate. Means are now being taken to measure the virgin liquor, with a view to determine the amount of ammonia therein and in the gas entering the bubbler, and thus arrive at an approximate figure for the recoverable sulphate. Preliminary test shows the following results for winter working:

Data.—Make of gas . . 10,500 c.ft. (60° Fahr.) per ton of coal.
Virgin liquor . . . . 13 gallons.
Virgin liquor retained by tar . . . . . ·6 ,,
Total, 13·6 ,, ,,

Ammonia in crude coal gas entering the "bubbler:"

	Grains per 100 c.ft.
On Feb. 6, 1917	146
,, 7, ,,	122
Mean	134

Gas bye-passed to purifiers, half-hour per day.
Spent liquor from still (say) 20 gallons per ton of coal.
Ammonia in same, about 0·05 p.ct.

Ammonia in terms of Sulphate of Ammonia, lbs. per ton of coal.

Whence,

Entering "bubbler" $\frac{10,500}{100} \times \frac{134}{7000} \times \frac{132}{34} = 7·8$

In virgin liquor and tar $\frac{136}{100} \times 2 \times \frac{132}{34} = 10·6$

Entering purifiers (say) 2 p.ct. of 7·8 = ·2

Total = 18·6

Table D.—Condition of Purifiers during Various Periods of Working—Good and Bad.

Experiment.	Moderate. I.	Poor. II.	Bad. III.	Very Good. IV.
Period	Dec. 18/16 to Jan. 3/17	Jan. 10/17 to Jan. 18/17	Jan. 31/17 to Feb. 3/17	Feb. 3/17 to Mar. 7/17
Number of days	16	8	3	32
Gas passed.				
Thousands of cubic feet	2370	1270	478	4420
Rate per 24 hours, c.ft.				
Whole period	148,000	159,000	159,000	140,000
Last day	143,000	166,000	147,000	134,000
Average gas passed per square foot superficies per 24 hours.	1020	1100	1100	970
Steam below bottom grids	All boxes	All boxes	All boxes	All boxes (supply fails last day).
Ammonia bye-passed.				
1½-in. bye-pass inlet to exit bubbler (rotary stopped).	Full on	Full on	Full on	Full on
All gas bye-passed (with rotary working).	Average, 25 min. per day.	Average, 30 min. per day.	Average, 40 min. per day.	Average, 2¼ hours per day. (On five nights all gas bye-passed during repairs to plant.)
Oxide of iron as charged.				
First purifier	⅔ new bog; ⅓ old.	⅔ new bog; ⅓ old.	⅔ new bog; ⅓ old.	Old artificial oxide.
Second purifier	,,	,,	Old artificial oxide.	Old bog oxide (30 p.ct. S.).
Fouled oxide.				
Character	Alkaline, 2 grids.	Alkaline, 2 grids.	Alkaline, 1 grid.	Alkaline, 2 grids.
Soluble iron	*Nil*	*Nil*	*Nil*	*Nil*
Average moisture (all grids) per cent.	8·8	18·5	Very moist	1·5
Temperature.				
First purifier. Average, all grids.				
Whole period °C.	36·0	30·5	29·5	32·5
At finish °C.	40·5	30·5	30 0	29·0
Second purifier.				
Whole period °C.	31·0	29 5	28·0	37·5
At finish °C.	34·0	30·5	29·5	28·5
Excess temperature of middle over bottom layer—Average °C.				
First purifier	+4·5	− 5	*Nil*	−1·5
Second purifier	+4·0	+ 5	+3	−5·5

Experiments on the Sulphiding of Hydrated Oxide in Model Purifier.

The experiments were only commenced in January, 1917, and were of a preliminary character, to determine the best method of procedure. The material treated was a sample of unused N.E. Dutch bog ore. The purifier consisted of a glass cylinder about 305 mm. (12 in.) long by 45 mm. (1¾ in.) diameter, fitted at each end with a rubber stopper carrying the necessary connections. A glass rod, centrally placed, carried four superimposed rubber discs to serve as grids. The discs were pierced with holes, and covered with a thin layer of cotton wool to support the oxide. About 58 c.c. of oxide were used in each experiment, allowing a depth of rather more than 12 mm. (½ in.) on each grid. The gas used was crude coal gas leaving a scrubber fed with gas liquor containing about 1·95 p.ct. free ammonia; and in one experiment, with a scrubber temperature of 8·5° C. (47° Fahr.), the ammonia content of the gas was found to be 6·3 grains per 100 c.ft. of gas. Air is injected into the coal gas for use in the purifier at a later point in the system. No estimation of oxygen was made during the tests; but the amount present would, doubtless, be small. The direction of flow was downwards through the cylinder. Contrary to expectation, it was found that the greater part of the sulphiding proper occurred in the top layer of oxide; the remaining three layers being mainly effective in absorbing the residual traces of sulphuretted hydrogen. Observed through the glass, the oxide on the top grid was seen to blacken progressively downwards; the oxide on the second grid began to blacken towards the end of an experiment; that on the two lower grids showed no change of colour. But it is significant that, with the selected rate of flow—which was about 1½ times that of coal gas through an oxide purifier per unit of area at maximum rate (1000 c.ft. per square foot superficies per twenty-four hours)—traces of sulphuretted hydrogen were invariably found in the exit gas leaving the bottom grid. It was impossible, therefore, to determine the process of sulphiding by means of a lead-paper test, as in ordinary practice, and recourse had to be made to standard iodine. A satisfactory indicator was provided by passing the exit gas through a Drechsel's bottle containing 4·5 c.c. of N/10 I and 100 c.c. of water. The experiment was stopped as soon as ever the iodine was exactly

decolorized, and the volume of gas needed to effect the change was taken as a measure of the efficiency of the oxide under the observed conditions.

Much time had to be spent in determining the best procedure to follow; but it was finally decided to operate always with the same *volume* of material, whatever its density and degree of humidity. Samples of the oxide, therefore, were dried at various temperatures, and their efficiency compared with that of an equal volume of the undried material (58 c.c.) at different temperatures and varying rates of flow. Time did not permit of extending the experiments to determine the effect of varying the proportion of ammonia and air; but it is hoped to continue the work as opportunity offers. The following results are of interest. They indicate:

First.—That oxide of 16 p.ct. moisture—corresponding approximately to $Fe_2O_3 3H_2O$ (16·8 p.ct. moisture) is markedly more efficient than equal volumes of oxide containing 37 p.ct. moisture ($Fe_2O_3 6H_2O$) and oxide dried at 100° C. (Fe_2O_3) respectively, at both high and low temperatures.

Secondly.—That the efficiency of oxide shows a marked increase with every rise of temperature under all conditions of hydration.

Efficiency of Bog Ore—Effect of Hydration and Temperature.

Oxide Charged.	Time.	Total Gas Passed.	Rate of Flow.	Relative Efficiency.
58 c.c.	Mins.	c.c.	c.c. per Min.	
1. — Temperature. — 36° C. (97° F.):				
Air dried, 47 grams . . . (16 p.ct. moisture.)	125	67,000	535	100
Undried, 40 grams . . . (37 p.ct. moisture.)	116	59,800	515	89
Dried at 100 C., 47 grams . (Moisture, *nil.*)	69	38,400	555	57
2. — Temperature. — 5° C. (41° F.):				
Air dried, 46 grams . . .	52	26,200	505	39
Dried at 100° C., 47 grams .	37	19,700	535	29
Undried, 40 grams . . .	33	15,700	480	23

ADULTERATED COAL—FROM A NATIONAL ASPECT.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

That the coal at present being supplied to gas undertakings contains appreciably more inorganic matter than was usual in pre-war days, and that the make of clinker per ton of coal carbonized is consequently increased at the expense of products that are useful both in a National and in a commercial sense, is a notorious fact. The gas industry consumes about 18 million tons of coal per annum; and if the increase of incombustible matter is assumed to be 5 p.ct. of the whole—which, according to personal experience, is by no means an excessive estimate—it follows that purchases of this magnitude include 900,000 tons of worse than useless material, all of which is invoiced and paid for at the current exorbitant price of coal. A gas-works formerly using 10,000 tons of coal per annum, now finds that 10,500 tons are required to get the same effect. The money loss is directly £750; and we shall see presently that this by no means covers the whole.

Much might be said about common honesty and financial relations as between buyer and seller, and the desirability of an arrangement similar to that obtaining with sulphate of ammonia, under the provisions of the Food and Fertilizer Acts, whereby the payments made by the purchaser are based on the quantity of useful material, rather than on the actual gross weight supplied. On the present occasion, however, the subject is viewed from a national point only, not as affecting the accounts of gas undertakings or the rights of gas consumers, but in its relation to the conservation of labour, of transport, and economy of fuel, all of which are of paramount importance at the present moment in connection with the gloomy forebodings that are being advanced by competent observers, as to the prospects of supply during the ensuing winter. As such, it deserves serious consideration by all interested in these matters. It certainly equals in importance many of the suggested expedients for economy of fuel.

The cost of labour and transport is proportioned to the bare avoirdupois weight of material dealt with, quite irrespective of quality—a fact that does not appear to be fully appreciated. There is an evident tendency to regard a ton of best "North Country" as the same thing as a ton of "Welsh" or "Somerset." The expenses incidental to conveying and handling a ton of the most inferior coal are not less than for dealing with the highest quality of coal obtainable, even though it may be worse than useless, regarded as a source of economy in these respects.

Confining attention for the moment to the manufacture of coal gas, the increased cost of labour is not finished when the charge is placed in the retort. For the most part, it is repeated on the residual coke. In the retort-house, where it is usually drawn direct from the retort into the furnace, there is the handling of the excessive weight of ash, the whole of which passes on with the coke; the enhanced difficulty of adjusting the combustion and the air supply within the most advantageous limits; the heavy labour incidental to the removal of clinker; the increased quantity of useful combustible that is entangled in, and retained by, the same; and the serious increase in the cost of repairs and renewals, due to the shortened life of the furnace lining and the adjacent parts of the setting. All this applies also to the suplus coke sold to all classes of users. Evidently the wastage due to the additional 5 p.ct. of ash is far from being limited to a bare *pro ratâ* increase on the cost of transport and labour, or on the lower proportion of useful products obtained.

The loss of heat absorbed in raising the useless inert matter to the retort or furnace temperature, as represented in terms of tons of coal, is not an insignificant matter. The 18 million tons, including the 900,000 tons of added ash, must be raised to a carbonizing temperature of about 2000° Fahr. Taking the specific heat of the ash as equal to that of fire-clay, 0·22, the heat expended on the 5 p.ct. of ash alone is:

$$900{,}000 \times 2240 \times 0{\cdot}22 \times (2000 - 60) = \text{(roundly) } 86{,}000 \text{ millions B.Th.U.}$$

And so far as regards five-sixths of the coke, at least, this loss is repeated when it is consumed, in addition to the *pro ratâ* advance on loading and handling charges. The total loss from this source alone is therefore in the neighbourhood of 158,000 million B.Th.U. As it involves the consumption of additional coke in the retort-house, which otherwise might be sold and go to replace a corresponding heat value in terms of coal, and the practical available heating value of coal is some 22½ million B.Th.U. per ton, it will not be far wrong to represent it as equivalent to a loss or waste of more than 7000 tons of coal per annum.

Gas-works take only a small proportion of the total output of coal; but the above considerations apply equally to coke-ovens, and, with the exception of the repetition on the residual coke, to coal used for raising steam, the domestic fire-grate, and general fuel purposes. We may take it, therefore, that the causes that have tended to depreciate the quality of gas coal also apply to other varieties. So far as house coal is concerned, the depreciation is certainly not less. Instead of discussing useless and impracticable schemes, such as prohibition of the use of raw coal, or interference with the free right of purchase (conditions that would create so much friction between all parties concerned that, if they were adopted, the absolute necessity for a return to something very much like "as you were" would soon be evident), attention might well be directed to these practical considerations as a more likely direction in which to look for the desired results—viz., economy of coal, with a corresponding reduction in labour and transport difficulties, which have already reached an acute stage. The labour position is aggravated by the fact that the larger proportion of it is beyond the capabilities of females or substitutes, and calls for the services of physically fit men.

North British Association of Gas Managers.

The programme of the 56th annual meeting of the Association, which is fixed for Friday, the 7th prox., in the Philosophical Society's Hall, Bath Street, Glasgow, states that the chair will be taken at 10.30 by the President, Mr. John Lang, of Alexandria. In addition to the Presidential Address, there will be two papers—one by Mr. H. G. Ritchie, of Irvine, on "Continuous Vertical Retorts in a Fifty-Million Works;" the other by Mr. G. H. Sharples, of Glasgow, on "Tar Dehydration." The Council have decided that there shall be no lecture under the William Young Memorial Trust this year; and there will be no excursion. Owing to the large increase in the cost of printing, stationery, and other charges, the Council will recommend an increase in the annual subscription rates. The President will move that the name of the Association be changed to the "Association of Scottish Gas Engineers and Managers;" and the necessity of forming a National Gas Council for Scotland will also be discussed. During the proceedings there will be an adjournment for lunch.

Gas-Driven Motor Buses.—It is stated by the "Motor" that Messrs. Chapman & Sons, of Eastbourne, by running their coal-gas service from Eastbourne to London and back, have been instrumental in forming a chain of gas-charging stations on the route, with improved filling facilities. At each station gas-pipes have been brought out to the main road—thus obviating the necessity for running vehicles into yards and backing-out. The charging stations are at the following places: Whyteleafe, 14 miles from London; East Grinstead, 15 miles on; Uckfield, 13 miles on; and Hailsham, 12 miles from Eastbourne.

The Institution of Heating and Ventilating Engineers.—The Council have issued an appeal for further monetary support for the research work that is being carried on at University College, where the Department of Heating and Ventilating Engineering was some years ago established with a grant of £300 a year from the London County Council. The financial support at first accorded having unfortunately to a large extent fallen off, application for a grant was made to the Government Department for Scientific Research. As a result, the Advisory Council offered to recommend a grant of £225 per annum for the next two years, on condition that the Institution contributed a further sum of at least £150, and that the total amount of £600 should be expended during the two years on certain stipulated work. This offer the Council of the Institution have accepted.

STATE CONTROL OF GERMAN GAS-WORKS.

An Official Ordnance.

The Imperial Commissioner of Electricity and Gas—Prof. W. Kübler—has issued an ordinance which came into force on July 26, of which the object is to ensure the working of gas-works. The text of the ordinance and the attached regulations have been reprinted in the "Journal für Gasbeleuchtung" of the 4th inst.; and from this source we have made the following summary of them.

In order to ensure uninterrupted working of gas-works the Commissioner orders:

1.—Each gas-works must appoint one or more (according to its size) trustworthy representatives; preference being given to the manager of the works. In the case of State or Municipal undertakings, the representatives are to be chosen by the authority, and their selection does not affect their responsibility to the State or Municipality.

2.—New house connections, new service-pipes, and the installation of gas bath-water heaters and gas-fires are prohibited. In extremely imperative cases, with meters not exceeding 100 lights, the representative of the gas-works may make an exception provided it does not strain the output of the works; but such permits are subject to retraction. Other cases must be referred to the Commissioner through the proper department of the Central War Office.

3.—Gas consumption is to be restricted:

(*a*) Local rules are to be issued by the representative with due regard to the prevailing conditions. These are to be framed after consultation with the local authorities; and where the works supply a number of districts, undue preference to any district must be avoided. The extent of limitation of the supply will be settled for the time being by the Commissioner; being on a uniform technical basis for all works.

(*b*) Public lighting is to be restricted to the utmost possible extent.

(*c*) The representatives are empowered to prohibit the use of gas-fires for warming rooms.

(*d*) The lighting of lighting burners and cooking appliances for the purpose of warming rooms is prohibited.

(*e*) Contraventions of sections 2 and 3 (*a*), (*c*), and (*d*) are punishable by cutting off of the gas supply and by penalty.

4.—In industrial or factory installations in which gas is used, the manager, foreman, and assistants are each responsible in their particular sphere for the observance of the local rules made by the representatives and approved by the Commissioner.

5.—Industrial and business consumers are prohibited from accepting further orders the undertaking of which would cause or necessitate an extension of their allotted gas consumption.

6.—To what extent this Order is to be applied to consumers who manufacture the gas they use will be decided later.

7.—The gas-works are to charge an enhanced price, which the Commissioner will state in the attached regulations, for every cubic metre of gas consumed in excess of the allowance under section 3 (*a*).

The consumer, for a second or further contravention of sections 2 to 5, and the fitter for section 2, will be punishable by imprisonment for a term not exceeding one year and/or by a fine not exceeding £500.

Regulations.

I.—(*a*) Consumers, until further notice, must not use more than 80 p.ct. of their preceding year's consumption during the same period between meter readings.

(*b*) If the prescribed calorific power of the gas has been altered since the preceding year, the 80 p.ct. allowance of gas is to be increased or diminished proportionately.

II.—The limitation applies even to works engaged on work of importance to the war. Exceptional allowances, subject to revocation, are in general granted only for pressing war work, communal kitchens, hospitals, infirmaries, railway works, and water works, and extend in the first instance only to Oct. 1 next. The representative settles such allowances in consultation with the proper department of the War Office; but appeal may be made to the Commissioner.

III.—Works which last year limited gas consumption may, through their representatives, modify the 80 p.ct. restriction now ordered to compensate for the previous limitation.

IV.—New consumers are to be treated on the same basis as existing consumers of the same class.

V.—Exceeding the allowance for any period is to be prevented by stringent measures. For each cubic metre of gas consumed in excess of his allowance, a consumer is to pay the gas-works an additional sum of 50 pf. (=14s. 2d. per 1000 c.ft.). In special cases, this surcharge may be increased with the approval of the Commissioner.

VI.—The representative must issue the Order and regulations, and see that they are enforced within a week from the date of their promulgation (July 26, 1917).

LIMITATION OF GAS SUPPLY IN GERMANY.

Further Press References.

The correspondent to whom we have been indebted for previous translations of what has appeared in the "Vossische Zeitung" on the subject of the projected limitation of gas supply in Germany, has now forwarded two further articles from the same source, which were published on the 12th and 13th inst.

EXTRACT from the "VOSSISCHE ZEITUNG" of AUG. 12.

Limitation of Gas.—Conditions for Greater Berlin.

As already reported, a decree has been issued by the Government Commissioner for Electricity and Gas, limiting the use of gas by 10 p.ct.

The officials who have to carry out its terms have now fixed the conditions for Berlin, which they have published in the "Gazette." The maximum annual consumption is as follows:

365 c.m.	through a coin meter	. . . .	24 c.m.	for Sept. =	847 c.ft.
550 c.m.	,, an ordinary 5-lt. meter	.	32 c.m.	,,	1,130 ,,
800 c.m.	,, ,, 10 ,,	.	52 c.m.	,,	1,836 ,,
	(or a coin meter of the same capacity)				
1600 c.m.	,, a 20-lt. meter or coin ditto		103 c.m.	,,	3,637 ,,
2400 c.m.	,, 30 ,, ,,		155 c.m.	,,	5,473 ,,
3200 c.m.	,, 40 ,, ,,		207 c.m.	,,	7,310 ,,
4800 c.m.	,, 60 ,, ,,		310 c.m.	,,	10,946 ,,

For industrial or public-utility purposes, special conditions will prevail; but even then the consumption must not exceed 90 p.ct. of the quantity used last year. The limitation also affects war-work establishments. For some few establishments—as infirmaries, communal kitchens, and traffic—exceptions may be made. Any quantity consumed beyond the limits as fixed above will have to be paid for at the rate of 50 pfg. per c.m., [14s. 2d. per 1000 c.ft.]

It is further ordained that public lighting is to be limited as much as possible. In streets where traffic is not heavy, only the so-called indicator lamps need be alight.

The calorific value of the gas will, according to requirement, be reduced by admixture of water gas so far as this can be done—regard being paid to the purpose for which the gas is used. The gas-works will at once enter into negotiations with the large consumers respecting the reduction of their consumption.

EXTRACT from the "VOSSISCHE ZEITUNG," of AUG. 13.

Limitation of the Gas Supply.

The long-expected decree respecting the limitation of the use of gas has everywhere evoked expressions of the bitterest disappointment. Although the officials responsible for it are all practical men, their decree pays not the slightest regard to actual conditions.

As we have repeatedly pointed out in this paper, Greater Berlin has a large number of households which have taken to gas in order to use it for cooking and heating purposes.

It was originally stated that the use of gas in households would be limited by 10 p.ct., at the most 20 p.ct. That would have been accepted by the greater part of the population. Now absolutely no difference is made between gas used for lighting and gas for cooking purposes.

Before us lie the records of a household which, from necessity, uses for cooking purposes the whole of the gas through a 5-light meter. No other form of combustible is at its disposal. By the most economical management, 800 c.m. were required during last year. According to the new decree, it can only have 550 c.m.—a decrease of 30 p.ct. A whole host of families will, owing to the partial cessation of the central hot-water supply, be compelled to use more gas for cooking.

Have the officials, who have not even considered it necessary to submit for consideration to the communal representatives their stipulation which so closely affects the economical life of Greater Berlin, never considered that coal for cooking purposes is just now as good as if there were none to be had? The little coal which has been allotted to the smaller households must be saved for the winter, for protection against the cold. Petroleum as a means of lighting scarcely exists. Installations of electric light must not be made. A limitation of lighting gas in favour of cooking gas, the use of which (also in consequence of the changed conditions of subsistence) in many households, especially the smaller, has become unquestionably higher, appears impossible. How can they continually be on the watch that the consumption does not exceed the prescribed limits?

A whole lot of unsolved problems have been conjured-up by the new decree, which, in spite of its notification long ago, has suddenly come on us by surprise. The managers of the gas-works in Greater Berlin must be aware of this, for their telephones were never still all the morning. Will they be able to offer a solution at the interview they will have to-morrow with the representatives of the Berlin Press?

To us it appears as if the whole question must not hinge upon an entirely schematic limitation according to the number of meter lights. If anywhere, individual requirements must be given more consideration. The chief thing, however, is to arrange for a better supply of coal. As we learn from an authentic source, matters would be much better in this direction if another distribution of coal were arranged for—more in accordance with the need of Greater Berlin.

Institute of Metals and Gas-Heating.—At the autumn meeting of the Institute of Metals, on Sept. 19, nine papers are to be read, two of which will be of special interest to gas people. Mr. A. C. Ionides will treat of the "Principles and Methods of a New System of Gas-Firing;" while Mr. H. James Yates, of Birmingham, will contribute some "Additional Notes" to a paper to be read by Mr. L. C. Harvey, on the subject of "Fuel Economy in Brass-Melting Furnaces."

SIXTY YEARS AGO.

From the "Journal" of August, 1857.

Accident at the Chartered Gas-Works.—About half-past ten on Friday night last an occurrence took place at the Chartered Gas-Works, situate in Brick Lane, St. Luke's, which for some little time caused considerable consternation in the locality. We have been favoured with the following facts, which may be relied upon as strictly authentic. It appears that in the course of the fearful thunderstorm which passed over the Metropolis early in the evening, the cap on one of the cast-iron columns which supports the ends of the two girders was struck by the lightning. The cap was split, and the action of the gasholder in descending, by the escape of gas for the public supply, caused one of the guide-columns to be thrown over, bringing with it two of the girders connecting the columns, portions of which, falling with great violence upon the crown of the gasholder, occasioned three extensive fractures of the plates, from which the gas immediately rushed forth in large volumes. The immense iron column fell into the yard with a fearful crash, and broke up into four portions, one of which, falling upon the roof of the adjacent retort-house, broke through the cast-iron principals and lantern, but happily without occasioning any injury whatever to the numerous workmen engaged at the time in the building. At the time of the occurrence, the gasholder contained about 100,000 c.ft. of gas (the total capacity of the holder being 340,000 c.ft.). The ignition of the gas took place from a lamp in the yard, and occurred free from any explosion whatever, simultaneously with the falling of the girders and column, which gave the first intimation of any accident having occurred. For the space of about five minutes, the whole of the Metropolis was brilliantly illuminated by the immense body of flame that rose up high in the air. Several fire-engines arrived shortly after the outbreak of the flames. Fortunately, however, the services of the firemen were not required; for, owing to the admirable directions given by Mr. Upward, the Superintendent of the works, and the exertions of the men under him, the flames were subdued in a comparatively short period. The means adopted for extinguishing this immense body of flame were as follows: It was at once found that any application of water was perfectly useless; and the fractures being of very large dimensions, Mr. Upward, who had mounted on the top of the gasholder, personally placed several wetted boards over the apertures, so as to form a foundation for the application of wetted sacks, luting, and clay, which had the effect of extinguishing the flames in the space of about ten minutes.

The Laming Purifying Process.—At a most opportune moment, when gas managers are required to purify their gas with a minimum of expense, of nuisance, and of deterioration, Mr. Laming announced in glowing terms, by an advertisement which recently appeared in our columns, the grand *desideratum*—an absolutely unobjectionable process, offering "economy in room, labour, and materials, impossibility of nuisance, and a total absence of injury to the illuminating power." Curiosity was universally excited by this announcement, which it has been impossible to gratify till the all-important document termed the "specification" was registered; and we will now endeavour, as far as the obscurity, complexity, and verbosity of this specification will admit, to extract from it the "two grains of wheat hid in two bushels of chaff."

Canadian Gas Association.

It was at one time intended that a joint meeting of the National Commercial Gas Association of America and the Canadian Gas Association should be held in Detroit this year. The war, however, interfered with the intention being carried out; but the Executive Committee and the majority of the members felt it would not be well to allow the year to go by without the usual gathering. So this year the Executive arranged for a two-day meeting to be held in Toronto during "Fair time"—to-morrow and Thursday. The programme is only a short one—the President's (Mr. J. P. King, of Stratford, Ontario) address, various Committee reports, and formal business, and two short papers, the titles of which were not given, and discussions. Luncheon, dinner, and trips (on both nights) will fill out the time fixed for the gathering.

Gas-Meters in the United States.

The National Commercial Gas Association of America were recently asked to name the total number of meters in use in the United States for artificial gas; and as no such list was available, a compilation was made by searches through various channels. The figures are published in the August "Bulletin" of the Association. It is seen that there were in use at the end of 1916: Ordinary meters, 5,323,137; prepayment meters, 1,485,973; type not designated, 838,653—total 7,647,763. The State having the largest number in use was New York, with 1,897,663; and the smallest, Wyoming with its 661. After New York came (in the order named): Illinois, 902,084; Massachusetts, 659,542; Pennsylvania, 621,312; New Jersey, 583,200; California, 514,128. Then there is a big drop to Michigan, 323,583. After that there is no State using anything approaching a quarter-of-a-million meters.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Report of the Council for the Year 1916-17.

The following is an abstract translation of the first portion of the Annual Report of the Council of the German Association of Gas and Water Engineers, as presented to the General Meeting of the Association, which was held in Berlin on June 22 last.

War Activities of the Association.

For the third time the annual report has to deal with a year of war. Owing to the course of military events, and "after the scornful refusal by our enemies of the offer of peace," the people have had to make still heavier sacrifices of blood and property; and all work hitherto devoted to peaceful ends has had to be concentrated on the war. Consequently, the gas and water industries in the past year have had to contend with far greater difficulties than previously. It has therefore more than ever been the duty of the Council to extend and supplement the work of its organization in the service of the country, the army, and the navy, and in adopting war measures for the maintenance without interruption of the work of its members. Ungrudging and vigorous support to these efforts has been given by the Association's Committee on the Working of Gas-Works, and especially by its Berlin members, as well as by the Central Gas Bureau and the Commercial Union of German Gas-Works. Obviously, details of the work done cannot be given at the present time; but a brief review of the year's war in relation to the activities of the Association may be presented.

It appeared from the outset that gas-works were intimately concerned, both subjectively and objectively, with the events of the war. Prof. H. Bunte, the Acting General Secretary of the Association, received a summons to Berlin to participate in deliberations on important technical war questions and measures directly bearing on the working of gas-works. Primarily, these were the supply of tar and ammonia for the benefit of the army, navy, and agriculture, having regard to the cutting-off of imports of nitrate of soda and oil. These matters were dealt with by the officers, for the time being, of the Association, assisted by their Berlin colleagues—viz., Herren Reese (Dortmund), Lempelius (Berlin), Terhaerst (Nuremberg), Körting (Berlin), Schimming (Berlin), and Pfudel (Charlottenburg), since deceased. The execution of the adopted measures was entrusted to the Commercial Union of German Gas-Works, which deals with the bye-products of a large number of works. Circulars were issued giving orders for the reservation and disposal of these products, and the production of concentrated ammoniacal liquor. The organization which still exists was thus brought into being. Recently, at the request of the Imperial Commissioner of Nitrogen Supplies, it has undertaken to compile statistics as to the output of ammonia and ammonia salts by German gas-works.

After the State had sequestrated important metals, which were indispensable in meter manufacture, a pronounced shortage of gas-meters was felt, when the scarcity of petroleum caused a considerable increase in the number of gas consumers. To overcome the difficulty thus created, an impartial office was formed by the Central Gas Bureau, with the support of the Union of German Gas-Meter Makers, to deal with applications for the necessary metal, and the testing of other materials and substitutes and their distribution. The office had also dealt with the supply of other materials, such as iron, leather belts, &c., necessary to gas-works. The Council issued a strong recommendation to gas undertakings to adopt the system of charging one price for gas whatever the purpose for which it was used; thus liberating the surplus meters, required under the system of differential prices for gas sold for various purposes which was hitherto prevalent in Germany.

A question of special importance, both materially and financially, was the extraction from the gas of benzol, &c., for munition purposes. In settling and rapidly carrying into effect measures therefor, the Association had the co-operation of its Instructional and Experimental Gas-Works, as well as the advice of two of its members well experienced in coke-oven practice—viz., Dr. Reuter and Dr. C. Schmidt.

Coal Supply.

During the first winter of the war—viz., 1914-15—the coal supply to gas-works was, with few exceptions, almost faultless; but during the spring of 1916 interruptions occurred in deliveries, and the stocks of coal on gas-works rapidly decreased. On April 18, 1916, a conference upon the matter took place at the Prussian Ministry of Commerce and Industry, which was attended by representatives of the colliery owners. The upshot was, broadly, that the supply to gas-works of a sufficient quantity of usable coal was regarded as assured. Gas-works were notified of the arrangements made, by which they were to apply to their usual suppliers for the coal they required, and in case of difficulty to appeal to Herr Lempelius as the representative of the Association's Committee on the Working of Gas-Works. But this announcement has not been fulfilled. From the beginning of the severe winter of 1916-17, transport difficulties grew, and with them complaints of deficient deliveries began. In the course of time these complaints became general, and a few works were unable to meet the demands for gas. In some places it became necessary

to restrict the output of gas considerably by limiting the supply to certain times, or even by interrupting it entirely.

Meantime, numerous proposals were made for economizing coal or replacing it partially or entirely by other gas-making raw materials, such as lignite, wood, &c., or for adding water gas to the coal gas. The Association's Committee on the Working of Gas-Works, in the course of several sittings, thoroughly discussed and examined these proposals and other possibilities. Owing to the great differences in local conditions, the Committee refrained from making general recommendations; but its members expressed themselves as ready to publish, or communicate through the District Associations, their practical experiences of the proposals, &c., so as to give the other members some guidance on the measures applicable to particular cases. The information thus afforded has assisted in overcoming many difficulties.

The Association have done everything in their power to ward off a repetition of the shortage of coal, with its consequent unavoidable interruptions of gas supply, by which large sections of the public suffer greatly both in the home and in business, and serious dangers are courted. In April last, the Central Gas Bureau inquired by circular of all gas-works what their coal requirements would be for the year 1917-18. The replies furnish almost complete figures for the coal consumption of German gas-works, totalling about 10 million tons. They have been laid before the Official Coal Distribution Department, and ought to form a basis for further measures. It is hoped that the strong representations made in this way will ensure the requirements of gas and water works being duly provided for. The importance of these works to the public at large has been set forth, as a ground for preference being accorded them in the allotment and transport of coal, in petitions to the Federal Council and to the Head of the War Office. [The petitions are reproduced in an appendix to the report of the Council.] Coal Distribution Bureaux have been started for the general supply of places with sufficient fuel, especially for the coming winter; and the co-operation with them of gas managers is specially desired, and will doubtless be given.

The Council have given attention to the rising price of coal, which continues to fall off in quality, and have addressed a petition on the matter to the Chief Imperial and State authorities. So far, however, these petitions have had no result.

Taxation.

The Coal-Tax Bill was adopted by the Reichstag with very little alteration, and was promulgated on April 8 last. It puts a tax, the proceeds of which go to the Imperial Exchequer, on both imported and home-raised coal, equal to 20 p.ct. of the value at the pit's mouth. Provision is made for gas, water, and electricity works to make legally an addition to their existing tariffs, equal to the increase in manufacturing or working expenses caused by the tax. The Federal Council can appoint Arbitration Courts to decide questions in dispute as to the incidence of the tax.

The Association appointed a Special Committee on Taxation to study and report upon this coal-tax in all its aspects. The Committee held several sittings to discuss the bearing of the tax on gas and water works, the mode of passing it on to consumers, and the Arbitration Courts to settle disputes. [The text of the Association's petition on the matter to the Federal Council is appended to the report.]

Curtailed Use of Gas.

The Federal Council have ordered a reduction of gas consumption, with a view to avoiding any waste of gas; but as the Order referred only to consumption for lighting purposes, and left the much mere important use for cooking untouched, the Council offer no criticism of the Order. Also, the Federal Council last spring introduced "Summer Time" on a more extended scale than last year. The information collected as to the effect of the measure last summer showed that, while a reduction of consumption could generally be traced therefrom, it was in no way of serious proportions, and there is no reason to anticipate any considerable change on the same account this summer.

A Gas Department has been established by the War Supplies Office to grant permits for necessary repairs and extensions on gas-works. The head of the Department is Prof. Kübler, who has the assistance of a Committee of eight members, of whom six—viz., Herren Hase (Lubeck), E. Körting (Berlin). Lempelius (Berlin), Prenger (Cologne), Terhaerst (Nuremberg), and Schimming (Berlin)—are members of the Association. The Department began work in April last.

Labour.

Steps were taken by the Association to procure the exemption or return of indispensable men and officials, and representations made to the authorities of the great importance of gas and water supply both to the civil population and the war departments were received favourably, with the result that gas and water works have been classed with munition factories, &c., as regards reservation of employees. [A reprint of the petition on the subject which the Council addressed to the Minister of War is attached to the report.] The representations of the Council that retort-house labour should be entitled to the scale of rations for those engaged in the heaviest toil were also acceded to.

Much has been done in the course of the year towards providing men discharged from the Services with training to enable them to pursue civil careers. With this object, several courses of instruction for gas-fitters, and one at Carlsruhe for gas testing, have been instituted; and already reports of the services rendered by those who have been thus trained have been received, which are very favourable.

Co-Operation of Technical Associations.

Thanks to the harmonious co-operation of the Central Gas Propaganda Bureau and the Commercial Union of German Gas-Works with the Association, gas-works have suffered comparatively little throughout the thirty-five months of war; and it may be hoped that they will be in a position still to serve the community equally well. In order to avail themselves as far as was reasonably possible of the valuable assistance of Herr Lempelius, the Director of the Central Gas Bureau, the Council decided to entrust him, along with Herr E. Körting, of Berlin, and Herr Kümmel, of Charlottenburg, with the representation of the Association's interests in Berlin. Also, in order to signify the co-operation of the two bodies, it has been arranged that the Central Bureau shall become affiliated to the Association in the same way as the District Associations.

(To be continued.)

RAPID ESTIMATION OF THE STRENGTH OF SULPHURIC ACID.

The "Analyst" publishes the result of an investigation upon this subject by Mr. H. Droop Richmond, F.I.C., and Mr. J. E. Merreyweather. In reproducing the article, the "Chemical Trade Journal" says: While it appears a simple problem, the rapid estimation of the strength of sulphuric acid presents many practical difficulties. The direct titration involves a weighing of a very hygroscopic substance, and a titration with a strong standard alkali, which has an appreciable coefficient of expansion. Under these circumstances rapidity is not easy of attainment, and Messrs. Richmond and Merreyweather have found that the factors which make for rapidity do so at the expense of accuracy.

The density cannot be employed as an index of the strength, owing to the abnormal density of strong sulphuric acid; the maximum being attained at 97·5 p.ct. The gradients of acids near this strength are low, and the influence of impurities on the density and the temperature corrections sufficiently large to render the calculation of strength from the density unreliable.

The authors turned to another physical property—the heat evolved on dilution—and found that this gives good results in a minimum of time. Howard has described a method for determining the strength of sulphuric acid from the heat evolved on mixing an oleum of known SO_3 content with water; and the authors have adopted one detail from his paper—the use of a vacuum-jacketed flask as a calorimeter. Their method consists in measuring 400 grms. of water at about 18° C. into a vacuum-jacketed flask, provided with a stirrer and thermometer reading to 0·01° C. The temperature soon becomes constant and is read off. Then 5 c.c. of the sample are measured in, allowing the pipette to drain for fifteen seconds, and the mixture stirred till the temperature is constant. No cooling corrections have been found to be necessary.

The water equivalent of the calorimeter was found to be 14·5 grms., and the volume of sulphuric acid delivered by a 5 c.c. pipette 4·911 c.c., varying from 4·869 c.c. to 4·926 c.c. From the mean of these data, and from the results of Pickering, the following formula was calculated:

$$\% = 100 - 7{\cdot}6\,(3{\cdot}994 - R).$$

With other calorimeters the formula is:

$$\% = 100 - 7{\cdot}335 \times \frac{400 + w}{400}\left(4{\cdot}139 \times \frac{400}{400 + w} - R\right).$$

There is some slight doubt as to the proper value for the corrections to infinite dilution to be subtracted from Pickering's figures for a strength corresponding to the author's final dilution, as the two series given by him do not agree very well. But they have taken the mean.

Using this formula, they have found the following results:

R.	Percentage Calculated.	Percentage by Titration.
3·635°	97·3	97·4
3·49°	96·2	96·1
3·22°	94·1	94·2
3·15°	93·6	93·6
3·01°	92·5	92·4

The concordance of duplicate determinations has been excellent, and usually within 0·02°.

The formula connecting percentage and rise of temperature is not quite so simple as that given. But the errors introduced by the simplification are less than those of experiment.

The method is very rapid; avoids all weighings; does not expose the acid to air; and entails nothing more than rinsing to clean the apparatus.

Next Saturday, the members of the Manchester and District Junior Gas Association will visit the works of the Staveley Coal and Iron Company. As the works are under Government control, no visitors are to accompany the party, which will inspect the extensive foundry, coke-oven plant, and bye-products works at Staveley, and lunch there on the invitation of the Directors of the Company.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Increased Tar Provision—Advice Wanted from the National Gas Council.

Sir,—The whole gas profession has been startled by a letter and circular sent out by the National Gas Council regarding the production of additional tar.

Now that gas engineers have had time to consider the instructions given by the Ministry of Munitions, they are at a loss to know if the National Gas Council (who we all understand is an Advisory and Consultative Council) were actually consulted about this important matter, and, if so, whether they fully considered and approved of the instructions that were issued by the Ministry. Whether or not they did this, as the circular was distributed by them, we are all looking for counsel, definite advice, and guidance from the Council on this matter.

The opportune article in this week's "Journal" indicates that the instructions may be a step in the wrong direction, and that, if the advice given in the circular is acted upon, it may be doomed to failure and disappointment. Your remarks, Sir, will certainly have some influence on the gas industry. It appears to me that we may all be involved in much trouble and expense, and the very results desired may be negatived by our action. We are therefore anxiously awaiting some advice and lead from the Executive of the National Gas Council, as upon them the industry relies for guidance in the many and important matters connected with war requirements. If the quantity of tar is increased per ton of coal carbonized, certainly for explosive purposes a poorer quality of toluol and benzol will result; the make of gas will be very much reduced per ton of coal; and if more plant (as suggested) is used, I do not know where the labour is to be found for working it.

Certainly, I, for one, want more reliable information on this question, as at present the scheme laid down does not appeal to my judgment and practical experience. Therefore, as a gas man anxious to do my part, I should like some sound, convincing evidence that the suggested line of operation is the correct one for achieving the dual desire of the Ministry of Munitions.

A Gas Engineer who Desires Advice from the Gas Council.

Aug. 22, 1917.

Increasing Tar by Lower Temperature Carbonization.

Sir,—I have carefully read the valuable leader in the last issue of the "Journal" upon the above most important question. As I read your remarks, you doubt and question on practical and technical grounds the request conveyed in the circular of the Ministry of Munitions, which may be taken to have been endorsed by the National Gas Council from the fact that they acted as the circulating medium. I have no doubt that we are all very desirous of producing the extra tar that is so urgently required for the furtherance of the war.

I believe I possess some exceptional evidence in support of your doubts. It shows that, if the instructions in the circular are acted upon, instead of an increase of the total output of tar, there will be a very material decrease. Gas engineers generally have been trained to make gas so as to secure profits at high temperatures; and, although they all know that by reducing the volume of gas made per ton by lowering the carbonizing temperatures a little more tar will be produced, they also know that such tar will not be so good from the point of view of the yield of suitable toluol and benzol. [The circular, however, only refers to quantity, but says nothing as to quality, which is a very important factor.]

I am not aware of any gas engineer who has ever made, or would ever dream of making, an experiment with a view to ascertain what total output of tar per day he could produce at low temperatures by sacrificing a large volume of gas per ton of coal carbonized and at an increased cost for labour. Therefore, I conclude that the gas industry has been called upon to take a step in the dark—not knowing what morass it will lead them into, and the enormous sum of money that may be incurred. And I fear, too, that they have no former experience to guide them in estimating the cost.

In support of my former statement as to decreasing the volume of tar, instead of increasing it, I am compelled, on public grounds, to point out to the gas industry that, during the last seven months, I have been occupied in directing the working-out of what I believe to be the largest practical experiments that have ever been made in this country on the carbonization of coal for chemical and other purposes, but the results of which it was not intended should at present be made public. The circular to gas undertakings on the required larger production of tar for war purposes, however, has altered the intention; and, as some of the practical results that we have secured bear very definitely upon this very important question of tars produced at high, medium, and low temperatures, I thought that the special experience we have gained would at this juncture be of value to the gas industry generally.

I was approached last year by a large chemical company having works in England and abroad, who desire in future to put up all their plants in England, for the good of themselves and the Old Country. They wished me to take charge for them of some large and elaborate experiments in the carbonization of coal for various chemical purposes; and this work has been going on, and is still proceeding with the assistance of four chemical experts (two emanating from London, and one an eminent Doctor of Science), and other gas engineers and operators. We have been working continuously at a modern gas-works with a setting of retorts carbonizing from 15 to 17 tons of coal per day; so that we have already experimented with about 3000 tons of coal. All this work had one object—the realizing of the best scientific knowledge attainable for the lay-out and design of a very large chemical works suitable for producing explosives, motor spirits, dye products, fertilizers, &c., to be erected at the pit mouth. These experiments have been most helpful. One result is that I advised the Company to purchase certain collieries. This they have done; and we shall start erecting the works as soon as the war is over.

I now propose to give you a few of the results of these experiments bearing chiefly upon the tar question. The Chairman of the Company, at my request, has kindly given me permission to do so for the benefit of the gas industry.

The commercial aspect of the carbonization of coal with high, moderate, and low temperatures has naturally received the specially careful attention of the experimenters; and it has been proved beyond a doubt that high-temperature carbonization produces by far the highest results per day for the labour and capital employed.

The following are a few results of the carbonization of coals, particularly bearing on the various outputs of tar produced at high, moderate, and low temperatures:

Test made with Coal of Poor Quality, containing a Large Percentage of Ash, and Carbonized at both High and Low Temperatures.

	No 1.—Four Days' Test of Coal at High Temperature.	No. 2.—Four Days' Test of Coal at Low Temperature.
Temperature outside retorts (average)	1400° C. (2562° Fahr.)	978° C. (1793° Fahr.)
Coal carbonized	43·1 tons	12·97 tons
Total gas made	495,280 c.ft.	94,346 c.ft.
Gas made per ton (corrected to 60° Fahr. and 30 in. bar.)	11,491 c.ft.	7272 c.ft.
Total yield of tar (dehydrated)	259 gallons	140 gallons
Tar made per ton of coal carbonized (dehydrated)	6 gallons	10·8 gallons
Calorific power of gas	441 B.Th.U.	479 B.Th.U.

	Gallons.
Total output of tar in four days at high temperature	259
" " " " low temperature	140
Reduction in output due to low-temperature carbonization	119 (or 46 p.ct.)

Test Made with Coal of Good Quality "H" Carbonized at High and Low Temperatures.

	No. 3.—Two Days' Test of Coal at High Temperature.	No. 4.—Two Days' Test of Coal at Medium Temperature.
Temperature outside retorts (average)	1404° C. (2559° Fahr.)	1160° C. (2120° Fahr.
Coal carbonized	34·32 tons	17·73 tons
Total gas made	477,053 c.ft.	237,351 c.ft.
Gas made per ton (corrected to 60 Fahr. and 30 in. bar.)	13,899 c.ft.	13,387 c.ft.
Total yield of tar (dehydrated)	447 gallons	292 gallons
Tar made per ton of coal carbonized (dehydrated)	13 gallons	16·5 gallons
Calorific power of gas	578 B.Th.U.	523 B.Th.U.

	Gallons.
Total output of tar in two days at high temperature	447
" " " " low temperature	292
Reduction in output due to low-temperature carbonization	155 (or 34·7 p.ct.)

The following excellent results were obtained in a

Two Days' Test of a Good Quality of Coal Carbonized at High Temperatures in the Ordinary Way. Afterwards Steam was introduced into the Retorts for the Purpose of Making Blue Water Gas.

	Two Days' Test of Coals at High Temperature Carbonized in the Ordinary Way.	Two Days' Test of Coal about the same High Temperature, with Steam Added to Make Blue Water Gas.
Temperature outside retorts (average)	1400° C. (2552° Fahr.)	1387° C. (2529° Fahr.
Coal carbonized	3308 tons	3193 tons.
Total gas made	464,184 c.ft.	530,126 c.ft.
Gas made per ton (corrected to 60° Fahr. and 30 in. bar.	14,032 c.ft.	16,603 c.ft.
Total yield of tar (dehydrated)	556 gallons	640 gallons.
Tar made per ton of coal carbonized (dehydrated)	16·8 gallons	20 gallons.
Calorific power of gas	533 B.Th.U.	505 B.Th.U.

It will be observed from the first experiment that we obtained a large increase of tar per ton of coal carbonized at low temperature, but of very poor quality, compared by analysis, with the high-temperature tars, and at a very great sacrifice of volume of gas, time taken up, and excessive cost per ton of coals for labour; while the total output per day of tar was very materially decreased, as the figures clearly prove.

The second experiment was made with a good coal at both high and medium temperatures; the latter being about the temperature employed in most gas-works at the present time. But we got about the same diminution of output in coals and tars, as in the first experiment—and the analysis showed that the lower temperature tar did not produce so good results in toluol and benzol as the high-temperature tars. The results further indicate that about double the plant will be required, which means double the cost on capital expenditure and labour charges to produce the same volume of tar as at high temperatures; and it is my opinion that there is not sufficient plant in the

country to produce the tar asked for by the Ministry of Munitions for war purposes by low-temperature carbonization methods.

Knowing the anxiety of gas engineers who have consulted me as to increasing their make of gas per ton, I have made other experiments with a moderate sample of coal. I first tested it in the ordinary way, with the results shown; and I afterwards added steam in sufficient quantities to produce blue water gas in the same vertical retorts, also with the results shown side by side. It will be observed that I produced a very largely increased volume of gas, and at the same time the volume of tar was materially increased—the gas being just over 500 B.Th.U.; but you will notice that this was accomplished by quite the opposite methods to those laid down in the circular.

The general results show that the larger volume of tar produced per ton of coal carbonized is inferior to that produced by high-temperature carbonization as regards toluol and benzol. Apparently in issuing the instructions and circular, sight has been lost of the important fact that, by lowering the temperature of carbonization, the total daily output of tar is at once materially reduced, which will considerably outweigh an increase in the make of tar per ton of coal by low-temperature carbonization. Besides this, the make of gas per ton of coal carbonized will be reduced to an alarming extent; and at the present time gas engineers are most desirous of increasing their make of gas per ton to help them over their financial and other difficulties. An exceptionally large increase of plant would be necessary to comply with the instructions; and I am of the opinion that this plant is not in existence or available at the present time. In most gas-works, too, the carbonizing plant is now undergoing repairs for the coming winter. Another objectionable feature of the proposal is that extra labour will be required at an enormous cost—indeed, I am of the opinion that such labour cannot be obtained to meet the proposal.

From the results of the experiments enclosed, it is obvious that the best course to pursue is for the Ministry of Munitions to continue to advise the public to use gas in every possible direction. By this means, more coal could be carbonized, and consequently a greater output of tar and ammonia products would be recovered. Sulphate of ammonia is now urgently required for agricultural purposes, and other ammonia products for high explosive purposes. As far as my present experience goes, I am strongly of opinion that the only way to meet the desired increase of tar is to advise all gas companies and corporation undertakings to carbonize as much coal as possible at a high temperature, and, if possible, to put to work further carbonizing plant for the purpose. If this plant should make more gas than is required by the consumers, the surplus gas, after being stripped of toluol and benzol, should be used for heating the retorts. By this means, more coke would be available; and this material is much desired at the present time.

By the means suggested, the most suitable tar for war purposes would be obtained, and in greater quantities, than by any other method; and at the same time an all-round advantage would be secured, without unnecessarily spending public money.

Southport, Aug. 22, 1917. JOHN WEST.

SIR,—Your leader in the "JOURNAL" for the 21st inst. contains some reflections on increasing the production of tar in gas-works which I believe to be founded on a misconception.

The quantity of tar obtainable from gas-works can be augmented in one of four ways:

(i.) By the substitution of coal gas for water gas.
(ii.) By reducing the temperature of carbonization.
(iii.) By reducing both the temperature and the pressure of carbonization.
(iv.) By reducing the time of the retort charges.

The first method is already being adopted in some works—especially where stocks of gas oil have given-out, and difficulties have been experienced in obtaining fresh deliveries.

The second method can only be carried out where a water-gas plant or where spare carbonizing plant is available. For it must be assumed that whatever method be employed, the supply of gas shall adequately meet the demand. This being so, spare benches, together with a number of the fully-worked retorts, could be devoted to low-temperature carbonization without restricting the total output. Alternatively, all the settings could be worked at the lowest temperature which yields the total desired quantity of gas. The adoption of such a method would result in each manager working at a temperature depending on the proportion of spare to total plant possessed. Where a water-gas plant is available, it would be possible to reduce the temperature of the retorts, making up the gas deficiency with water gas; but it is doubtful whether the total make of tar would in this way be increased.

The third method depends on the fact that to convert coal into the maximum amount of tar, it must be distilled at the lowest possible temperature, to avoid decomposition of the liquid products. As existing gas-works plant is not suitable for the production of "vacuum" tar, this method need not be further considered.

The fourth process is one which can be most readily adopted, as it involves only a slight change in the prevailing routine. It is based on the assumption that, in modern practice, no tar is being evolved during the last hour or so that a charge lies in a retort; so that, from the standpoint of tar production, this time is wasted.

By withdrawing the charge an hour or two earlier, and working at the usual heats, the quantity of tar made per retort is increased in direct proportion to the additional amount of coal carbonized.

There is no reason to expect that this method would yield a better quality tar, except in so far that it is in contact with a richer gas. The drop in the gas make per ton would probably be fairly balanced by the increased quantity of coal carbonized.

The effect of these methods on the benzene and toluene in the gas should be considered. By shortening the period of charging, the gas would contain a larger percentage of aromatic hydrocarbons. By reducing the temperature of carbonization, the gas would also contain more hydrocarbon vapour, but of a composition differing materially from that normally obtained. The ratio of benzene to toluene—usually about 3 or 4 to 1—would tend to become inverted, while the amount of paraffins would be increased.

These remarks apply to low-temperature tar—the methyl derivatives, toluene, the cresols, methyl, naphthalene, &c., increasing at the expense of the simple ring compounds, benzene, phenol, naphthalene, &c.

Aug. 24, 1917. B.SC.

SIR,—With reference to your leader on "Lower Temperature Carbonization and Tar Production," and your remarks at the bottom of the first column of last week's issue, it appears to me there is an error in your premises, and that your argument, in consequence, largely falls to the ground.

You state: "Reduced carbonizing temperatures mean a reduction of carbonizing capacity per unit of plant," and that "it follows that diminished capacity means diminished throughput of coal." I think a more careful consideration of the matter will lead to the opinion that reduced carbonizing temperatures mean a reduction of gas-producing capacity per unit of plant; but surely there is no ground for stating that the throughput of coal will be reduced. On the contrary, it is within the experience of most gas engineers that, in order to maintain high temperatures with retort-settings of only moderate efficiency, the throughput of coal has to be restricted. It therefore follows that in such cases, if lower temperatures were adopted, the throughput of coal could actually be increased, although not to any large extent.

The practicability of the low-temperature carbonization proposal seems to me to depend almost entirely upon the provision of the necessary supplies of additional coal and additional labour. These are essentials for such a scheme; and unless they can be guaranteed, gas engineers cannot possibly carry out the requests made to them, and at the same time keep up the supplies of gas to their districts.

Although as a general principle, gas in place of coal is to be commended, under the present abnormal conditions and the certainty in many works of every available retort being in use this winter, it is to be hoped that any active propaganda with the object of increasing the use of gas will be left over until after the war. Most engineers and works superintendents find the prospects facing them for the coming winter to be almost alarming; and certainly increased demands for gas are the last things to be desired. When conditions are more normal, we shall all hope for a big development in the demand for gas in place of coal, and will be able, I hope, to extend our plants to deal with it.

Weston-super-Mare, Aug. 24, 1917. JAS. TAYLOR.

[With reference to our correspondents' comments, we may refer them to the data given in the letter (above) of Mr. John West and to an editorial on the subject this week.—ED. "G. J."]

The Question of Sliding-Scale Injustice.

SIR,—Although it is undeniable that the present untoward circumstances could not possibly have been contemplated by any sliding-scale arrangements, it does not necessarily follow that sliding-scale companies are entitled to relief from the consequences of them.

Has it been sufficiently considered that some, at any rate, of these companies are still in a position to pay dividends at their standard rates, and that most, though not perhaps all of them, have for many years paid dividends in excess of these standard rates, and consequently in excess of what would have had to content them had they remained maximum dividend companies? What answer is to be made when the question is asked—as it will assuredly be asked in Parliament—why such companies cannot take the rough with the smooth? What, in such case, would become of co-partnership with the consumer?

Assuredly, however, a continuance of conditions such as did not exist when present obligations were incurred would fully justify an application for revision of terms. But have we yet the materials on which to base such an application, and would it be listened to at the present time if it were made? I am afraid the answer to both questions is in the negative.

CHAS. HUNT.

17, *Victoria Street, S.W., Aug.* 25, 1917.

SIR,—The pages of the "JOURNAL" and its Editor's time are so generously applied in this cause that I hesitate to again worry you upon the present iniquitous position. But one or two points arising out of the South Metropolitan meeting on the 15th inst. cannot be ignored.

The Chairman (Mr. Charles Carpenter, D.Sc.) complains that sliding-scale companies are unable to compete with free industrial concerns. But, Mr. Editor, does he expect trades unionism, as an act of grace, to arrest *its* claims because *ours* are neglected, or that while war continues the cost of living will do anything other than generally advance? Has sufficient of the shadow not yet been seen to prepare us for coming events?

The ups-and-downs of gas output now come under the influence of fortune's wheel rather than management; but not *all* have experienced the good fortune which materially reduces standing charges to the immediate benefit of dividends.

And what do shareholders know of the suspension or postponement of renewals or repairs as a consequence of the present war, and prospective ill-effect upon dividends unless there be relief?

Mr. Paddon's quaint conceit that "Not one (of the great gas companies in the country involved by the sliding-scale) would be heard in Parliament until the claims of the South Metropolitan Company and its larger neighbour had been considered" is, without rudeness on my part, absurd.

Coal contracts of gas undertakings in the North have been completely disorganized for the convenience and benefit of those in the South; and if the *South* does not move, the *North* will.

If half the energy would only be displayed in some quarters over shareholders' true interests as was recently manifested over an untimely Building Scheme, we should realize "Some Move."

Aug. 24, 1917. OIKONOMIA.

Re-Issue of Debentures.

SIR,—With regard to the inquiry in this week's "JOURNAL," you may be interested to learn what was done by my Company in similar circumstances.

In 1915, certain debentures became due for repayment; and new ones for the same amount were issued and sent up for stamping and registration. We were then informed that the officials in the stamp office required to be satisfied that the sanction of the Treasury Commissioners to the issue of the instruments had been obtained before they would proceed to impress the duty. A long correspondence followed. The Company were required to give an undertaking not to incur fresh capital expenditure in existing circumstances for any purpose, unless of pressing necessity in connection with war requiremnts. The sanction of the Treasury Commissioners to the issue was at last obtained.

Further debentures falling due in 1916, I wrote for advice to the Chartered Institute of Secretaries (of which I am a member) asking whether they could be kept in force. Their reply was as follows:

> "Yes, by agreement with the debenture holders; but such agreement must be made *before* the date when the debentures become due. [How such an arrangement would be regarded by the Treasury authorities is doubtful; we believe they would require some of the debentures to be paid off.] The agreement can be effected by endorsement on the debentures."

The debentures were accordingly renewed by endorsement [copy enclosed], signed by the holder and by myself on behalf of the Company, and stamped with a 6d. stamp ["JOURNAL," March 7, 1916, p. 537, and March 14, p. 591]. The same thing was done again this year.

I did not consult the Treasury Commissioners on the matter, and have heard nothing from them about it.

A. S. CAMPBELL, Secretary, Wellingborough Gas Company.

Wellingborough, Aug. 22, 1917.

[ENCLOSURE.]

MEMORANDUM.—It is agreed that the repayment of the principal sum of one hundred pounds secured by the within bond is postponed, and that it shall be paid off at any time after the expiration of six months' written notice by either party, such notice expiring on any day appointed for the payment of interest. And it is further agreed that the interest shall be increased from 4 p.ct. per annum to 5 p.ct. per annum from the 1st day of July, 1917.

Dated this day of 1917.

REGISTER OF PATENTS.

Manufacture of Ammonium Sulphate.—No. 108,098.

ADAM, W. G., of the Beckton Tar and Ammonia Products Works.

No. 17,940; Dec. 13, 1916.

The patentee says: For many years trouble has been experienced with ammonium sulphate, as made commercially, owing to its acid character. Commercial ammonium sulphate contains from 0·5 to 2 p.ct. of sulphuric acid, and the acid destroys the bags in which the sulphate is packed. But, according to his invention, commercial ammonium sulphate is rendered neutral by passing ammonia gas through it—the sulphate being placed on a grid and the ammonia gas blown through it, or the sulphate may be continuously fed into an inclined rotating cylinder in which it meets a stream of ammonia gas passing in the opposite direction.

The patentee mentions that he is aware that it has been proposed to employ the bisulphates or the acid sulphates of ammonia for treating gases so as to obtain ammonia therefrom; and he is also aware that it is not novel to treat dry broken-up acid ammonium sulphate with ammoniacal gases to convert the acid sulphate into neutral sulphate. What he claims is: "Passing ammonia gas through commercial ammonium sulphate to render it neutral substantially as described."

Destructive Distillation of Carbonaceous Substances. No. 108,200.

WELLINGTON, S. N., of London Wall, E.C.

No. 10,658; July 27, 1916.

This invention relates to the destructive distillation of coal at comparatively low temperatures; and it has for its object "to effect the further decomposition of the constituents of the gases and vapours evolved in the distillation and to avoid the presence of paraffin bodies in the resulting gas and tar."

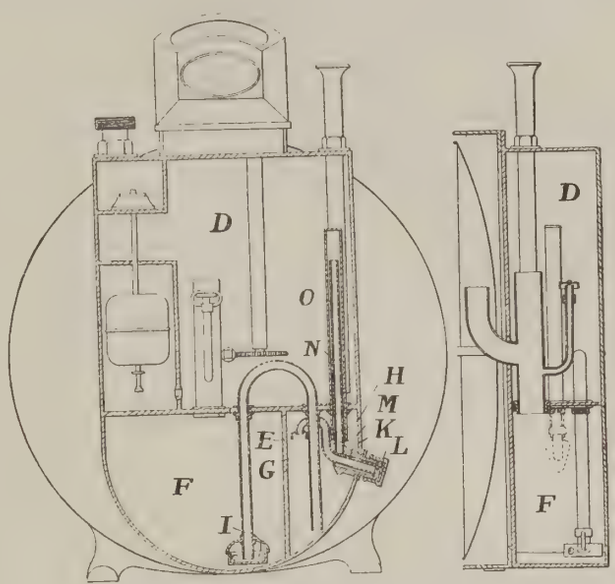
The distillation is effected within vertical retorts gradually tapering outwardly towards the lower end—the retorts being advantageously formed of an oblong sectional shape [no drawings accompany this specification]. The distillation is carried on at a comparatively low temperature, and preferably the heat is applied to the retort in two or three zones. For example, the retort may be divided into four zones. In the lower one the heat applied to the charge may be about 450° C.; in the zone next above, it may be 500° C.; while in the zone next above, it may be 550° C. In the uppermost zone, a free space is left; and the heat there applied may be from about 980 to 1200° C. Within this space a grid is suspended from the top cover plate of the retort (by a rod cased in fire-brick) and made of any form which will present a considerable area for contact. The grid is formed of metal, fire-clay, carbon, or metal oxide. By this means the rich hydrocarbon vapours containing paraffin bodies are subjected to heat by which they are partially or wholly converted into aromatic bodies; and the gases produced undergo decomposition.

Wet Gas-Meters.—No. 108,206.

WILSON, J., and PARKINSON AND W. & B. COWAN, LTD., of Fitzalan Street, Kennington Road, S.E.

No. 10,792; July 31, 1916.

This invention relates to meters having "an upright return conduit for maintaining a double seal against the escape of gas from a compartment in which the junction of the two limbs of the conduit may be carried above the level to which liquid may rise in the compartment"—the object being to "render such sealing devices for wet meters less susceptible to entirely losing their supply of sealing liquid."



Wilson's and Parkinson and Cowan's Wet Gas-Meter.

The meter shown is of the usual construction, having a front box divided by a horizontal shelf so as to form a large upper watering compartment D, while the lower portion is divided by a vertical partition E into a waste-water box F and an adjoining and smaller compartment G. Through apertures in C pass the two limbs of an inverted **U**-tube into the compartments F and G. The former leg reaches nearly to the bottom of F, and the other one as far as possible down the compartment G. The apertures, by means of glands or stoppers, are rendered gas-tight—the semicircular portion being carried up as far as is necessary within the compartment D to give any required seal to the compartment F.

Within the waste-water box is a small receptacle like I, the bottom of which is only sufficiently removed from the bottom of the syphon tube to allow free access of liquid to it. In the side or bottom of it is a small hole (the cross-sectional area of which is less than that of the tube) through which liquid can enter the receptacle and reseal the tube after it has been emptied, due to the level in the box falling to the edge of the receptacle. The compartment G has a water outlet syphon H of ordinary type, in which an annular passage K surrounds the portion of the tube passing through the casing. The ends of the passage and the water outlet tube are both closed by a cap upon the outside of the meter casing.

As heretofore constructed, the annular passage is provided with an air pipe leading up into the top of the water outlet syphon compartment; but according to the present invention the ordinary short air pipe is replaced by a pipe M (of considerably increased length), which reaches up above the top of the compartment G into D. In order to accommodate the pipe, an orifice is formed in the shelf C immediately above the pipe. It is made large enough to contain an outer tube N which encloses M and provides an annular passage O surrounding it. The pipe N is closed at its upper end, and its open lower end preferably extends a short distance below the bottom of the syphon H or the water level of G. The tube N forms a return conduit sealing device for the compartment G, to prevent gas escaping from it in the event of a pressure above that of the atmosphere existing while water is issuing from the syphon.

In operation, the distance between the liquid levels in the box F and the syphon compartment G will be the same as in a meter of ordinary construction; but the length of the **U**-tube provides an increased seal owing to the fact that when the liquid in the waste water box has been driven to the bottom of the right leg the **U**-tube will not immediately become completely filled with the gas, because as soon as this enters it will only occupy the higher portion of the tube and force down the liquid in the left leg. In these circumstances, the liquid will form a seal sufficient to balance the difference in pressure between the gas in the box F and that in the upper portion and right leg of the **U**-tube; while the pressure of the latter is balanced by the height of the liquid between the level in the compartment G and the level to which the liquid is forced down in the leg of the tube situated in it. This will allow a considerable difference between the pressures existing in the waste-water box F and the syphon compartment G without any actual passage of gas from one chamber to the other.

The seal formed by the extension of the air-pipe M and the provision of the covering tube N prevents liquid passing too rapidly from the waste-water box F through the **U**-seal tube, as might occur when a meter which has been watered at a moderate pressure has the syphon outlet cap removed when under a much higher pressure. Instead of the pressure in the compartment G being immediately re-

duced to that of the atmosphere when the syphon outlet cap is removed (as is the case in ordinary constructions), the return conduit sealing device formed by the extended air-pipe M and the covering-tube N prevent this, as the water is driven up the annular space O between the two and forms a seal sufficient to balance the increase of pressure in the syphon compartment, while the syphon H itself prevents the escape of anything but liquid at a speed corresponding to its resistance, until the liquid level has fallen below the syphon mouth. A pressure surge will not, therefore, result in loss of gas, and the kinetic effect of a rush of liquid will not readily unseal the U-tube.

Mixing the Gaseous Constituents of a Combustible Mixture.—No. 108,277.

Ionides, jun., A. C., of Porchester Terrace, W.

No. 3611; Nov. 8, 1916.

This invention relates to devices for mixing the constituents of a combustible gaseous mixture—being a modification of patent No. 102,983. The object is to obviate the difficulty of back-firing in the conduit leading from the mixing device to the combustion chamber, consisting in a device for mixing the combustible constituents by a whirling motion in an annular chamber or conduit in which the device is formed of fire-brick or like refractory material positioned closely adjacent to the chamber in which combustion occurs. It further consists in a round-nosed or like pointed end of a refractory cylinder forming the inner surface of the annular chamber being moved to co-operate with a coned or tapered seating to control the outlet orifice of the chamber.

Treating Coke for Use with Heating Stoves. No. 100,968.

Schollkohlen-Gesellschaft m.b.h., and Schollenbruch, A., of Dusseldorf, Germany.

No. 10,425; July 24, 1916. Convention date, July 22, 1915.

The object of this invention is so to improve coke in an inexpensive way, that "its effect is very similar to that of good pit coal."

The coke, in medium or small size pieces, is introduced into a fluid material containing a mixture of thirty parts of coal dust and twenty parts of clay mixed with water, and vigorously stirred up with the coke until it is taken up and all the pores of the coke filled with the coal and clay mixture.

The coke remains in the bath from twelve to twenty-four hours, according to the size of the pieces; and, after it has been taken out, it is treated with material which likewise consists of coal dust, clay, and water, but is less fluid. Equal parts of coal dust and clay may be used and be stirred up into a pulpy state with the thickly liquid residue from the bath previously used, until the material forms a complete coating for the coke. Then the pieces, after being dried, are sprinkled with "unalloyed coal dust in order to improve the appearance."

The treatment described is said to approximately restore to the coke the properties of pit coal. The coke burns slowly and produces a clean sootless fire, which can be treated like a pit-coal fire; while it is "freed from the disagreeable crackling sound which has always been observable hitherto when it is burning."

The new fuel is produced very cheaply, the patentees remark, as, in consequence of the increasing production of gas and bye-products, the production of coke is constantly greater, and coke can be obtained relatively cheap, while the materials employed in the mixture—viz., coal dust and clay—are almost valueless.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 22.]

Nos. 11,588—11,895.

Alexander, R. M.—"Applying coal gas for driving internal-combustion engines." No. 11,609.

Andrews, F. A.—"Cutting metals by gases." No. 11,666.

Banks, W.—"Bunsen burners." No. 11,879. And "Water-heaters." No. 11,880.

Bray & Co., G.—"Gas-burners." No. 11,724.

Couchman, A.—"Machines for pleating and sewing incandescent mantles, &c." No. 11,776.

Fletcher, Russell, & Co.—See Banks.—Nos. 11,879, 11,880.

Fletcher, T. W.—See Banks. Nos. 11,879, 11,880.

Fryer, G.—See Andrews. No. 11,666.

Gibbons Bros.—"Continuous annealing-furnaces." No. 11,718.

Hall, H. E. and Hamblet, J.—"Production of hydrocarbon gas for power uses." No. 11,870.

Ionides, A. C.—"Gas lighting." No. 11,891.

James, T. C., and Jones, O. T.—"Synthesis of ammonia." No. 11,619.

Marle, M. van.—See Gibbons. No. 11,718.

Maxted, E. B.—"Pressure furnaces for use in synthesis of ammonia, &c." No. 11,643.

Perry, T.—"Gas cooking-stove lighting torch." No. 11,831.

Smith, T. A.—See Maxted. No. 11,643.

Theisen, H. E.—"Purifying, cooling, and mixing gases." No. 11,766.

The centenary of the public lighting of Glasgow with gas occurs on Sept. 15 next year; and the Watching and Lighting Committee of the Glasgow Town Council recommend that it be remitted to a Special Sub-Committee to consider and report as to what should be done to commemorate the event.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

South Staffordshire Mond Gas (No. 2) Bill.

Before the adjournment, there was read and referred to the Examiners a petition of the South Staffordshire Mond Gas (Power and Heating) Company under their common seal, praying for leave to bring in a Bill to confer further borrowing powers upon the Company, together with a copy of the proposed Bill annexed thereto. The Bill is to be read a second time on Oct. 17.

LEGAL INTELLIGENCE.

FINE FOR ILLEGAL USE OF COPPER.

Before Lord Ilkeston (the Stipendiary), at the Birmingham Police Court, last Tuesday, the Parkinson Stove Company, Ltd., were summoned for unlawfully failing to comply with an order restricting the use of copper, made by the Minister of Munitions, and for using 9 cwt. of copper sheet in the manufacture of geysers and water-heaters, contrary to Regulation No. 2 E. of the Defence of the Realm Act. They were also summoned for using copper tube and copper sheet in the manufacture of water-heaters and geysers which were not for the purpose of any contracts or orders certified to be within Classes "A" or "B," Circular L33, as to the Control of Output issued by the Minister of Munitions. Defendants pleaded guilty, and were fined £100 and costs.

Mr. Hurst, who prosecuted at the instance of the Ministry of Munitions, explained that last December, owing to the scarcity of the metal, a stringent order was made restricting the use of copper in the manufacture of articles for private trade. After the issue of the prohibition order, the Minister of Munitions noticed an advertisement in the "Ironmonger" relating to the sale of water-heaters the manufacture of certain parts of which involved the use of copper. The Company were asked for an explanation of the circumstances; and they at once gave the information asked for in the fullest way. They stated, on Feb. 19, that subsequent to the date of the order 111 orders had been executed which entailed the use of copper; and in respect of 30 of them the necessary certificates had been obtained. Seven of the remaining orders were completed from stock. While, added Mr. Hurst, most firms using copper in this country could only get permits from the Ministry of Munitions in one application out of a hundred, the defendants executed orders without the slightest attempt to get a certificate, though they must have known from the fact that they received 30 certificates that they were absolutely necessary.

Mr. F. E. Smith, on behalf of the defendants, said they regretted very much that they should have infringed the order. The copper that was used in the supply of the articles came out of their stock, and had not been purchased since the issue of the order. It was used for orders received prior to Dec. 8 [the date of the order]. No doubt if the defendants had properly appreciated the order they ought to have asked for certificates to cover the orders received; but they had an impression that, as a result of representations made by a number of trade associations, there would be some modification of the order. The fact remained, however, that they had been proved to have disobeyed the letter of the law. They also were aware that articles supplied to gas companies and to plumbers were being used in the interest of the national service; and they thus thought they were acting within the spirit of the Munitions Act. What they ought to have done was to ask for a certificate to cover orders which they already had on Dec. 8. The defendants had furnished the information on which the proceedings were taken. Although they had disobeyed the letter of the law, he submitted that nothing really blameworthy had been done.

The Stipendiary said he regarded the case as a very serious one. Defendants must have known what was required of them, inasmuch as certain certificates came into their hands. It looked very much as if in the other instances they knew they would not get the certificates if they asked for them.

A fine of £50 was imposed in each of the two cases. Costs were allowed of £5 5s. in each case, making the total penalty, with Court fees, £112. Other summonses were withdrawn.

Measurement of Natural Gas Purchased in Bulk.

A decision of the Pennsylvania Supreme Court, confirmed on appeal, as reported in the "Gas Age," is to the effect that natural gas sold by a landowner, under a lease providing for royalties on the quantity metered at the head of the well, but silent as to the pressure at which such measurement should be made, assumes the same to be the line pressure, and subject to any variations that may obtain from time to time. The owner alleged that the local custom was to correct the bulk to a pressure of 8-in. above atmosphere, and applied for disclosure of the daily pressures on the inlet of the meter, to admit of such adjustment of the quantity to be paid for. But the company denied the existence of any custom, and contended that the true meaning of the stipulation for measurement at the well, without other conditions, was that the bulk should be taken at the line pressure for the time being. The practice of expressly stating 8, 10, or 16 in. pressure in agreements was admitted. The Court held that there was no evidence on which any particular pressure could be assumed in a contract containing no specification as to the same. This interesting precedent should be noted by all concerned, in the purchase or sale of gas at pressures that materially affect the bulk, as compared with that at atmospheric pressure.

MISCELLANEOUS NEWS.

CROYDON GAS COMPANY.

The Half-Yearly General Meeting of the Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

Increased Consumption and Works' Plant.

The Chairman, in moving the adoption of the report and accounts, said, in common with the majority of gas undertakings, in and around London at all events, the Company had to record a very substantial increase in the sales of gas during the half year, amounting to no less a quantity than 76 million c.ft. The prolonged cold weather in the early part of the year accounted for much, but not all, of this; and they were now maintaining a rate of output well above that of last year. Such evidence of the growth of the business was, of course, gratifying; but so near were they to utilizing all their resources of manufacture that there had been times when they would gladly have seen a somewhat lessened output day by day. The coming winter, if the weather proved as inclement as that of the last, would call for all the energies of their Manager at the works and of the assistants and workmen there. Particularly felt had been the lack of the new gasholder which, but for the war, would have been in use some two years ago. The shortage of storage not only made the working in the winter difficult, but also less economical to an extent which, though not directly measurable, was yet considerable.

Suspension of the Fixing of Gas-Fires.

With these facts in mind, the proprietors would not be surprised that the Directors decided last autumn, as a matter of considered policy, to suspend largely for the present the activities of the Company in adding to the number of gas-fires in use in the district, and to cease letting any additional fires out on hire till more favourable times came round again. It would be seen from the report that the increase in stoves for the half year was less than they had been accustomed to, being only 751, of which 565 were represented by sales, and 186 only by additional stoves hired. The cost of gas-stoves now was very high, as was that of fixing them; and he believed it was a good policy to defer the continuance of their efforts to increase output in this direction until it represented a less heavy addition to capital expended than it would do under present conditions.

Increased Expenditure Overbalances Increased Revenue.

On both sides of the revenue account would be noticed, as was to be expected, large increases as compared with last year. There was an increase of £22,000 in the cost of coal and oil, while sales of gas had produced £23,000 more. Last half year, foreseeing the heavy charges they would have to bear for raw materials, the proprietors would remember that the Directors carried forward as a reserve under this heading the sum of £7500, which had now been used up. Allowing for this, and for the fact that in the June half of 1916 they carried forward to the December account the sum of £5000, it would be seen that the real added cost for coal and oil in the half year exceeded by £11,500 the increased receipts from gas. This was partly offset, it was true, by an increase of £7500 from residuals. He might say that the whole of the sulphate of ammonia the Company produced was now being used for home agricultural requirements. But the profits had, under the heads he had mentioned, been adversely affected, notwithstanding the increase in gas sales (in normal times a source of increased profit) to an extent of £4000 in the half year. It would also be observed that a very substantial increase had been made in the charges under the head of war bonus and allowances to dependants of men on service. These items of expenditure they would not, he was sure, grudge to the employees. They were amply deserved. In all, 260 employees had joined the army or navy; and he regretted to say that of these sixteen had lost their lives. But the proprietors must not lose sight of the fact that these charges had to be met. Many of their neighbours among gas companies had found it necessary recently to make substantial additions to their prices for gas—up to as much as 8d. per 1000 c.ft. The Directors would, if forced to raise the price, do it most reluctantly, and to as small an extent as they deemed compatible with safety, and not earlier than circumstances necessitated. Nevertheless, if freights continued to rule as high as they now were, they might have no option but to raise the price. He was glad to say they had received information that day that freights were decreasing. They all hoped it might be so; for freights had been at an abnormal rate for a long time.

Hampering Restrictions and Contradictory Demands.

In many ways they had been hampered in their efforts to work economically by Governmental restrictions and requirements. In times like these, they would not, he was sure, wish to complain of this, nor to be too critical as to the wisdom of the varying and occasionally contradictory requests and demands made upon them. He doubted if the many special services the gas industry had rendered, and was rendering, to the country were anything like adequately understood, even by the shareholders in gas undertakings. Certainly when the whole history of the war came to be told, it would be seen that the value of the industry to the country had been far greater than any of them could have foreseen three years ago. The tar dehydration plant, completion of which was promised for March of last year, had been in operation during this summer, and, so far as could at present be judged, was giving satisfactory results. A debenzolizing plant, for recovering from the gas certain constituents urgently required for military needs, was now, they hoped, nearing completion, though long overdue.

Minimum Bonus and a Contributory Pension Fund.

Reference was made in the report to the fact that a contributory pension fund had now been established. This would assure to all the co-partners what had for thirteen years been assured to the staff—namely, that, if they remained in the Company's service until no longer able to work, they would have a retiring allowance proportioned to their wages and length of service. They had also revised the co-partnership scheme to the extent of providing for a minimum bonus of 4 p.ct., part of which was earmarked as the co-partners' contribution to the new pension fund. This was a novel departure in the co-partnership scheme, but one, he hoped the proprietors would agree, fully warranted by the exceptional, and unforeseeable, circumstances brought about by the rise in the price of all commodities, including the raw materials of their business.

An Exhibition and Remembrance.

The good feeling among the employees was shown in a pleasing manner a few days ago when an exhibition, organized by themselves, was held as a competition among allotment holders, and to add to a fund raised by weekly contributions among them, for the purpose of sending periodical reminders to their fellows in the army and navy that they had not been forgotten by their colleagues at home. He was pleased to say the proceeds of the exhibition amounted to £21; so that there would be more money to spend on sending gifts to their men at the front than there had been in the past. The show was a most successful one, of over 500 exhibits, and supplied an afternoon's interest which he, with several of his fellow Directors, most thoroughly enjoyed. Such rivalry was a healthy and friendly one—financially too, thanks to the kindness of Mr. Hooker in selling the exhibits by auction at the conclusion of the afternoon, the fund he had mentioned was, as he had said, considerably helped.

Redeemable Mortgages.

To return to the financial affairs of the Company the Directors issued in May £10,000 of redeemable mortgages. The issue was largely over-applied for; but they could only obtain the sanction of the Treasury to the issue of this small amount.

The Financial Result.

The dividends the Directors recommended the proprietors to declare, at the statutory rate, would absorb about £1300 more than the net profits of the half year; but, as they would see, the carry-forward would be a substantial one.

The Deputy-Chairman (Mr. Thomas Rigby) seconded the motion.

A Delegated Issue.

Mr. Charles Webb asked what was the expense of issuing the £10,000 of redeemable mortgages.

The Chairman: The amount was only a little over £100.

Mr. Webb said he could not help wondering, when the Directors placed this stock outside to issue, why they were not capable of issuing such a small amount from the office, so as to save whatever expense would be incurred. He thought the Company were quite capable of placing the stock from headquarters. The South Metropolitan Company were issuing £250,000 of redeemable preference stock from their office; and he was sure it would go off like hot rolls.

The Chairman said they could not issue the stock without some expense; it had to be advertised, tender forms issued, and so on. This accounted for a considerable part of the expense. They went to Mr. Richards, who had a good reputation among gas investors.

Mr. Webb said he was not discussing the matter from that point of view. It was only that it struck him the expense might have been saved.

Mr. Rodman: Mr. Richards might get people to pay a bigger price than the Company. He has a large connection.

Mr. A. W. Oke: We can congratulate the Board on the successful issue of the stock, and the nominal rate at which it was issued.

The Chairman remarked that the Company had themselves on many occasions, when times were good, issued debentures. But these were peculiar times; and, in the opinion of the Directors, the way the stock was issued was the best under the circumstances.

Mr. Henry Field remarked that he noticed the unaccounted-for gas was nearly 43 million c.ft. This appeared to be rather high.

The Chairman replied that one half year was very light, and the next very high. The unaccounted-for gas had that peculiarity. If they looked at the previous half year, they would see the item was very low. It was low even now compared with other gas companies. If, too, they took the meters one day less than another, it made a good deal of difference. The average for the Suburban Companies last year was 6·59 p.ct., and that of Croydon was 3·7 p.ct. Their average for this year was 5 p.ct.; so that they were now even better off than the other Suburban Companies. He trusted this was satisfactory.

The motion was unanimously carried.

The Dividends.

Mr. Henry Woodall proposed the declaration of dividends at the following rates per annum, less income-tax: 14½ p.ct. on the "A" stock, 11½ p.ct. on the "B" and "C" stocks, 5 p.ct. on the "D" stock, and 10 p.ct. on the "E" stock. He remarked that he was quite sure the proprietors would all feel the results of the half year were very satisfactory, and that they were very fortunate in being able to pay the full statutory rates of dividend, and at the same time add nearly £2000 to the charges for repairs and maintenance. Of course this was very necessary, in times when the costs of materials and labour were so high as now, and when there was difficulty in getting customary work carried out. Then they had an additional item in the contribution of £382 to the Co-Partners' Pension Fund. Further, the war bonus and payments to the dependants of men on war service had increased by nearly £5500. When they considered all these items, and noticed that the carry-forward had only been reduced by £1300, and still remained at the satisfactory figure of £11,444, he felt sure the proprietors would feel the financial position of the Company was a very sound and good one. In a sense, he supposed he was the technical gas man on the Board; and he should like to tell the proprietors that he had had the pleasure of going round the works with Mr. Caddick; and found them, as he always did, in most excellent condition. Further, he should like the proprietors to know that everything was well in preparation for the winter's work. This was most important. As the Chairman had told them, the increase in the sales of gas was very heavy; and they must have every bit of their plant in the best possible state to meet the

increased demand that they were certain to get. It spoke well for the forethought of the Engineer that he had got everything in such good condition; for, with the best intention, it was very often very difficult to get work done at all now.

Mr. Percy H. Hall, in seconding, said he should like to say that Mr. Cash, who usually proposed this resolution, had written regarding his inability to attend. He had been rather overworked; and it was thought another week's holiday would be a great advantage. Mr. Cash hoped he would be excused on this occasion.

The motion was unanimously carried.

Votes of Thanks.

Mr. Charles Webb proposed a vote of thanks to the Chairman and Directors for their continued good management of the affairs of the Company. He was sure there was no body of gentlemen more deserving of thanks than those who were at the present time connected with the management of the affairs of gas undertakings. The times had for them been most anxious and strenuous; and when Directors were, under such circumstances, able to give them dividends such as their Directors were doing that day, it was extraordinary.

Mr. J. T. Maitland seconded the motion, which was very heartily adopted.

The Chairman, on behalf of his colleagues and himself, thanked the proprietors for the vote. The times had been anxious; but he was glad to say they were, as Mr. Woodall said, well prepared for the most difficult part of the year's work. They had not the same anxiety regarding coal as they had this time last year; for they were getting in a good stock for the winter. The Chairman proceeded to propose a vote of thanks to the officers, staff, and workmen, for their efficient services during last half year. It was not every company that possessed such good officers, staffs, and workmen as they did. They were all doing their best in the interest of the Company, and were trying to cement the good feeling that had existed between their men and themselves for so many years. He was sure the proprietors would agree with him that what had been done in altering the co-partnership scheme had been a wise policy. In returning thanks to Mr. Caddick, Mr. Topley, Mr. Sandeman, and those assisting them in all departments, as well as the workmen, they must not forget their women workers, who were working exceedingly well under their new conditions.

Mr. Samuel Spencer seconded the motion.

Annual Meetings Opposed.

A Proprietor suggested that the Company should follow the example of the great banks, and now hold annual instead of half-yearly meetings. This would save the staff a large amount of trouble, and the Company expense in printing.

Mr. Oke said there were two sides to this question. Proprietors must watch very carefully these points. He was sorry to say—of course, he was speaking generally—that some of the safeguards of stockholders in joint-stock companies were being kicked away. People seemed to scarcely realize what it meant when half year by half year the stockholders of gas companies were called together. He looked upon these meetings of shareholders as safety-valves; and if there were any points the proprietors wished to bring before the Board, this could be done at these meetings. He urged them not to give up any of their rights. They hardly knew what was possible in many companies. It was actually possible for a man to have a seat at the Board, and also be solicitor to the Company, and so occupy a position of profit. Why were these things possible? Because shareholders of companies were actually going to sleep; and they did not watch Parliament making changes of this kind which removed safeguards.

The Chairman said in their case they could not hold annual meetings in place of half-yearly meetings without authority in an Act of Parliament. It had been the custom to hold half-yearly meetings, and was it worth while disturbing this custom, and going to the expense of an Act of Parliament to do it? ["No, no."]

Replies of Officers.

Mr. A. Caddick said, on behalf of the staff and all engaged in the manufacturing department, he should like to express their thanks for the kind way the Chairman had proposed the vote of thanks. He was sure the vote itself would be particularly welcome at this time, surrounded as they were day by day by difficulties, which seemed to increase rather than diminish. He felt the words that had been used would be an encouragement to all concerned. He could not say too much for his staff, and for the way the workmen had helped him during the half year. They had before them a very difficult winter to face. As the Chairman had intimated, the consumption of gas was largely increasing. Up to the present time, from July 1, the increase had been 11 p.ct.; and there was the possibility of a larger increase in the colder weather, with no additional apparatus to bring into use. From this it would be understood they were going to have a very anxious time next winter. But with confidence in the good feeling and assistance that were the vogue at their works, he believed they would get through. They were increasing the coal stocks, and they hoped to continue to do so up to the end of September, when no doubt they would be in the same position as last year. With regard to oil, the position was not so satisfactory. The Government had stopped supplies; and, although the Company had some oil in stock, there was not enough to last them through the winter. He hoped the application he had made to the Explosives Supplies Department of the Government would bring them a portion of their winter's supply. He thanked Mr. Woodall for the complimentary remarks he had made as to the works. The struggle to get the work forward for next winter had been very severe. Most of their work was, he was happy to say, completed, or would be in a week or two; so they would face the winter with the plant in good condition.

Mr. Topley also replied for his staff, remarking that he knew from his day-by-day observations how thoroughly well the vote was merited by those who did the routine work. The Company were well served; and the Company deserved to be well served. The proprietors who had been in the Company for any length of time knew that the Directors had always considered the true interests of those who served the Company as one of their first objects of concern.

With reference to the step that was taken during the half year, and approved by the propristors that day—the establishment of the pension fund—he felt sure, although a small beginning, in years to come it would be found to be one of the most beneficent things the Directors had ever done both for the employees and in the permanent interests of the Company. As to the suggestion that an annual meeting instead of the half-yearly meetings should be held, he appreciated the wish to lighten his burdens. The change would save a certain amount of labour; but any saving of expense would be considerably less than might be supposed. A great deal of the work connected with the half-yearly meetings would still have to be done whether or not they were held.

Mr. W. J. Sandeman, on behalf of the distribution department, also acknowledged the vote. He was sure it was thoroughly well deserved. One and all of his staff and men had done their best under the trying conditions of the half year.

BOURNEMOUTH GAS AND WATER COMPANY.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. Crispe Whiteley in the chair.

The Secretary (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

An Unavoidable Absence.

The Chairman, in moving the adoption of the report and accounts, said he was sorry to be absent from the last half-yearly meeting. He had no choice in the matter. It was not even a question of the doctors. He simply could not move; and therefore he could not be with them. It was the first time, since he had had the honour of occupying it, that he had been absent from the chair; and probably it was the first time he had ever been absent from a Board meeting since the prehistoric times when he was appointed a Director. This was only a prelude to thanking his colleague, Mr. William Cash (who unfortunately had himself broken down in health and was not able to be with them that morning), very heartily and sincerely for the full financial statement he made at the last meeting.

The Ups and Downs of Gas Management in War Time.

With regard to the report and accounts, they were, in his opinion, of a most remarkable character. Never in the history of the Company had their anxieties been heavier, the changes more fitful, or the dangers and difficulties that had surrounded their work greater than during the last six months, and never, let him add, had their troubles been more bravely met or earnestly dealt with or successfully grappled than they had been by their Acting Manager (Mr. Moon), and the excellent staff with which he was surrounded. He did not propose to go into all the ups and downs which were now constantly occurring for any Board who had to deal with the affairs of a gas company. Buying coal and getting it to Bournemouth had been a matter of great difficulty. The same could be said of oil. The different policies of the Government also had to be met. He proposed to give the proprietors a few of the essential figures out of the accounts, and mention some interesting events that had happened during the half year. At the same time, he should wind up, as he generally did, by congratulating the proprietors, in spite of the vicissitudes, upon the present position of the Company, and showing hopeful prognostications to the proprietors and the worker co-partners when the period of war ceases.

The Accounts Examined.

Coming to the capital account, they had issued no fresh capital during the half year; but they had expended £2754. On the other hand, they had written-off for depreciation £8019, which gave a balance of £5264 in excess of expenditure. The increase of revenue had been of a satisfactory character; the receipts for gas being £11,402 over the receipts for the corresponding period of 1916, or an increase of 14 p.ct. Taking it on the quantity of gas sold, it was about 11½ p.ct. The increase in the percentage on money value was owing to the advance in the price from Lady-day of 2d. per 1000 c.ft. It would perhaps bring the meaning of this increase home to the proprietors more clearly when he said that, in order to satisfy the consumers, they had had during the half year to make 705 million c.ft. of gas, compared with 555 million c.ft. in the corresponding half before the war. In water revenue they had a small increase of £270, or 1 p.ct. As to the residuals, they might be considered as fairly satisfactory. There were, in regard to them, only two points he wished to mention. The first was the difficulty of getting rid of the surplus tar; and the second was that, owing to the limitation by the Government of the price of sulphate of ammonia, the restriction put upon its export, and the increased cost of sulphuric acid, the profit had been distinctly limited. On the other hand, all these steps had popularized sulphate with their farmers, which, he thought, showed that the makers had a great benefit to which to look forward in years to come. Taking the half-year's revenue, they had an increase of £15,203 which was extremely satisfactory, and if it stood there, he thought they could exult. However, so far so good. But, on the other hand, they had a large increase in the expenditure. In getting coal and oil, they had had to spend an extra £19,389, which, it would be seen, more than swallowed up the nice increase of revenue. Taking the whole revenue charges, they were £133,711, as compared with £114,120 in the corresponding half of 1916, or an increase of no less than £19,590. If they deducted the increased revenue of £15,203, they got the result of a decreased profit of £4387, which he thought was a small amount considering the trouble they had been through. Of course, it would have been much larger if they had not had the increase in the price of gas from Lady-day. But still it was moderate enough under the circumstances; and they were able by slightly reducing their carry-forward to pay the statutory dividend. There they had the whole thing in a nutshell.

The Loss of the s.s. "Corbet Woodall."

Coming to the events of the half year, by far the most important was the loss of the s.s. "Corbet Woodall." Built for the Company's ser-

vice some eight or nine years ago, and bearing a name of honoured memory, it had been busy bringing coal from the Tyne and the North during the whole of its life—doing its work thoroughly satisfactorily and well to the, in every sense, great advantage of the Company. It was lost on May 30. He need not tell the proprietors how, why, and by whom. That went without saying. But the first thing he might thankfully and gratefully say was that no lives were lost. He was not surprised over the loss of the boat. In fact, he had been thinking, with fear and trembling, each half year as to how soon it would go, running the risk that it did. They must, however, be thankful for what it did. It was the mainstay of the Company's coal supply; and no doubt its loss would tend to increase the working expenses of the Company. They could not get another boat—certainly at the present time, except at a prohibitive cost, although they were inquiring and doing their best. Meantime, they were getting an excellent coal supply by rail; and the result was that their present coal stock was most satisfactory. The changes of carbonizing methods and gas-works policy which were foreshadowed by the Ministry of Munitions would undoubtedly call for an increased supply of coal; but if the Government called for this increase, they would unquestionably give them the necessary help to provide it, and the situation would thereby be relieved.

Rise in the Price of Gas.

But when they considered the loss of their steamer, the rise in wages, and the price of coal and oil, the Directors were compelled, much to their regret, to announce another rise in the price of gas from July 1. They did not apologize for it; and he was sure their consumers were ready to receive it, however much they might regret having to pay it. They were not surprised. At the same time, what the Company were doing now in this respect, many important companies did long ago; and as this Company were the last to raise the price of gas, they would be the first to lower it as soon as they saw their way clear to do so.

Shells and Motor Fuel.

Then they were still making shells for the Government, and were employing 80 p.ct. of women for doing this work; and they were doing it thoroughly well, as, indeed, were the women employed in the general work of the Company. The Company were also using gas for motor vehicle purposes, and were thereby reducing the consumption of petrol. This was being done in a most satisfactory way—in fact, they had the privilege of claiming to be patriotic in this matter, and at the same time saving the Company expense.

A Minimum Bonus and a Pension Scheme.

Although he would have to deal separately with the matter a little later at the special meeting, he should like to say a few words with regard to their co-partnership scheme, of which they had always been very proud. They were one of the earliest companies to start it, following Sir George Livesey's lead; and they could claim that it had been a great success. The idea of giving the workers a share in the profits, so encouraging their thrift, and making as many of them as possible shareholders (the workers now held 1000 shares in the Company) had been followed by the best results. He could assure the proprietors that the annual meetings he had had the privilege of attending now for some years, at which he addressed the whole of the staff, had supplied him with one of the best and most pleasant duties that anyone in his position could possibly wish to carry out. But when the scheme was framed, they did not, and could not, anticipate the extraordinary convulsion that had taken place. The war, coming in as it had done, had destroyed and upset all their calculations with regard to the scheme. The present rise in the price of gas from July 1 absolutely banished the whole of the bonus of the co-partners. Strictly speaking, those who gained by the profits of the Company ought to be prepared to lose when the Company was not so prosperous. But they were not bound by logic. He thought it was Disraeli who said: "A country could not be governed by logic." And the Directors, after full consideration, thought they ought to recognize in some shape or form that the co-partners were in no way responsible for the war or for the changes that had occurred; and nothing they could possibly have done could have prevented it. Under these circumstances, in pursuance of the principles the Directors had always followed, they proposed two amendments. The first was that a minimum bonus of 4 p.ct. should be granted; and the second was that, as they were granting this bonus, they should take the opportunity of framing a complete pension scheme, which they had always wanted to do, and which had always been in the air to carry out when they could possibly effect it. Of course, they had always given a small pension to old and faithful servants, as they would always do. But the advantage of having a complete pension scheme was extremely great. He could assure the proprietors that their workers fully appreciated this when he spoke on the subject at the annual meeting. To receive a fixed sum which would be higher than any pension that probably they would have originally given, instead of an uncertain allowance dependent upon the whim or caprice of anyone, was a sounder and a stronger position for the workers to be in. It was a position they most fully and thoroughly appreciated. To have a Company of the position of their own guaranteeing the solvency of the scheme was also a very important matter indeed. In a few minutes he would be proposing resolutions to ratify these changes; and he had no doubt the proprietors would support the Board in making them.

The Position and the Future.

He said early in his speech that he would end by congratulations. He thought he could do so, because, after all was said and done, he doubted whether there was any industry in the world that had gone through a similar six months of such difficulty as they had passed through, and had produced such accounts, resulting in the payment of such a dividend. Regarding the future, they had a great deal to which to look forward. The war could not last for ever; and in the future, although they would not get back to normal times (he did not suppose they would ever get back to pre-war times), their customers would have got accustomed to the use of gas for the many and varied purposes for which they had never employed it before; and they would feel the comfort of its use. New developments were arising—such as the consumption of gas for motor power—and would continue to arise. He could not but anticipate, and did anticipate most thoroughly, that in the future they would be able to do even better than in the past, and that they would have greater and greater strength to go on to further triumphs.

Mr. A. W. Oke, in seconding from the shareholders' side of the table, expressed the pleasure of the proprietors at seeing the Chairman again in his accustomed place. All the proprietors too shared in the regret that Mr. Cash was unable to be with them. As to the report it reflected the atmosphere of Bournemouth. It was a fine report. The fact that the new increase in the price of gas was only 6d., and the previous increase only 2d., spoke volumes, he thought, for the careful policy that had been pursued in the past. He was glad that the Directors had taken the opportunity of making special provision for the co-partners in the present unlooked-for circumstances. It seemed to him there was justice in the suggestion; and he felt sure it would be particularly welcomed by the proprietors.

The Oscillations of Government Departments.

The Right Hon. Sir Daniel F. Goddard, M.P., said the Chairman had asked him to follow his speech, and to fill up any interstices that might arise. But he could not find any. The natural increase in the expenditure of a gas undertaking was entirely or largely dependent upon that part which was devoted to manufacture. Coal, oil, and wages were the items which were responsible for the chief increase of expenditure; and the proprietors knew that, under present circumstances, the Directors could not help this. They were things they could not control. There was one other item which showed a marked increase. That was war relief, which had risen from £800 to £1312. The proprietors knew what this meant. It meant they had men fighting and must make them allowances; and they must look after their families. Nobody could find fault with that. As one who had been through the experience of a practical gas maker, he was struck by the difficulties that the engineer and manager of a company like this had to encounter under the present circumstances. No one who had not been through similar experiences could know what it meant. The balance-sheet revealed to them very little of what these difficulties were—always having to be on the *qui vive*, always having to meet the new points that arose, always having to keep one's mind upon new appliances, and all that sort of thing. It was really a very trying thing for their Manager. Their Chief Engineer was still away; and the burden of the work throughout this time fell upon their Acting Manager; and he thought it was only right that the proprietors, as well as the Directors (who were constantly in touch with Mr. Moon), should realize how much they were indebted to him and the staff for facing the difficulties in the way they had done. The Chairman had alluded to many of these difficulties; and he had mentioned the changes in the policy of the Government. One could not at first realize what they meant. He called them something more than changes; he called them oscillations, because these Government Departments did not seem to know their own minds about these things—they did not seem to look forward enough. One day they came down and said: "You must use as little coal as you can, and dilute your gas with 20 to 25 p.ct. of water gas." The Manager at once set to work to adopt the necessary means to comply. Before he had hardly done this then there came another order: "We want more liquid fuel for our Navy, and you must use more coal and every available retort, and make less gas per ton. It does not matter what you do so long as you use more coal, and get more tar." Then the Engineer had again to set to work to see how he could alter his process. These were what constituted difficulties to the men who were responsible; and when the proprietors remembered that, notwithstanding these difficulties, the Company were going on making profits (although they could not exactly pay the dividend out of the half-year's profits, fortunately they had enough and to spare from past years), they realized how much they owed to the Manager and those who assisted him.

The motion was unanimously carried.

Dividends.

Moved by the Chairman, and seconded by Sir Charles J. Jessel, Bart., dividends were declared at the following rates per annum, less income-tax: 6 p.ct. on the preference shares, 7 p.ct. on the "B" ordinary shares, and 14 p.ct. on the original shares.

Extraordinary General Meeting.

The Minimum Co-Partnership Bonus.

An extraordinary general meeting was then held to consider certain alterations and amendments in the rules governing the Company's profit-sharing scheme, and a scheme provisionally approved by the Directors for the formation of a pension fund for the co-partner employees.

The Chairman, in moving the first resolution with regard to the payment of a minimum co-partnership bonus, said he was sure the proprietors would agree to this. It was impossible to allow the whole thing to fall through by not giving anything at all, although, strictly speaking and (as he had said) logically, if the men took the good, they should also take the bad. But they could not look upon the workers exactly in that light; and so the Directors thought it well to establish a 4 p.ct. minimum bonus. Under the new arrangement, for the year commencing July 1 last, the distribution of the bonus would be calculated on the following scale: If the price of gas in the Bournemouth district was at or above 2s. 10d. per 1000 c.ft., a bonus of 4 p.ct.; at 2s. 9d., 5 p.ct.; at 2s. 8d., 6 p.ct.; at 2s. 7d., 7 p.ct.; at 2s. 6d., 8 p.ct., and so on. The effect of this alteration, the proprietors would see, was to ensure a minimum bonus of 4 p.ct.; but the standard for any bonus in excess of 4 p.ct. would remain the same as the rules now in force. It was also necessary that the wording of Clause 5 of the Co-Partnership Rules should be amended. This alteration was to enable that two-thirds of the minimum bonus of 4 p.ct. could be applied *pro tanto* in payment of the co-partners' contribution to the proposed Co-Partners' Pension Fund. Under the former wording of Clause 5, one-quarter only of the bonus would have been available for this purpose; and the alteration was necessary to enable the rule governing the co-partners' own contribution to

the Co-Partners' Pension Fund to be carried into effect. Apart from these alterations, it was not proposed to, in any way, amend the co-partnership scheme; and it was hoped that all co-partners, both present and future, would, in due course, be entitled and become shareholders in the Company.

The Right Hon. Sir Daniel F. Goddard seconded the motion, which was unanimously agreed to.

The Pension Fund.

The Chairman said they now came to the pension fund, the salient features of which were: The fund would come into operation upon Sept. 1. All co-partners under 50 years of age on Sept. 1 this year were eligible. All employees admitted as co-partners on or after Sept. 1 this year would thereby become members. Members under 30 years of age at the date of joining would contribute 3 p.ct., and members of 30 years and over, 4 p.ct., on a sum equal to the amount of salary or wages. The contribution would be paid one-third in cash at the time of paying salary or wages, and two-thirds by transfer from the free portion of the co-partnership account—*i.e.*, the bonus from time to time placed to his credit. Co-partners who, on Sept. 1, this year, were 50 years of age or upwards, might contribute 4 p.ct., but the Directors would decide what pension should be paid having regard to all the circumstances of the case. The Company would guarantee the solvency of the fund, and would contribute half yearly a sum equal to the sum contributed by the contributing members, and would bear all expenses connected with the fund. The Directors of the Company, for the time being, were to be trustees of the fund. No pension would be paid for ten years from the commencement of the fund; but, in the event of the death of any member before he receives a pension, a sum equal to double the amount of his contribution (without interest) was to be returned to his representatives. In case of voluntary resignation or dismissal other than for fraud or dishonesty, a member leaving the service of the Company would receive the whole of his own contribution, with 4 p.ct. compound interest. A member attaining 65 years of age would retire (unless by mutual agreement he continued in the service of the Company), and took the pension to which he was entitled. The pension to which a member would be entitled would be one-sixtieth of the salary or wages he was receiving at the date of his retirement for each completed year of service with the Company, with a maximum of forty-sixtieths—*i.e.*, two-thirds of such salary or wages. As examples, a member, with 40 years' service at the age of 65, would receive for each £100 of salary or wages a pension of £66 13s. 4d.; a member with 30 years' service at the age of 65 would receive for each £100 of salary or wages a pension of £50; a member with 20 years' service at the age of 65 would receive for each £100 of salary or wages a pension of £33 6s. 8d., with proportionate pensions for intermediate periods and amount of salary or wages. No member was entitled to claim his pension before attaining the age of 65 years, and completing at least ten years' service. The scheme was framed on a liberal scale; and it was received with great approval by their workpeople. He moved its adoption.

Lieut.-Col. Charles L. Morgan seconded the motion, which was unanimously carried.

Votes of Thanks.

The Chairman proposed a hearty vote of thanks to the staff—Mr. Moon and Mr. Plumb particularly as representing the different branches—for the excellent service rendered during the past half year. The Company were splendidly served; and he should like the workers to feel that their services were recognized very deeply by the proprietors as well as by the Directors.

Mr. F. G. Barrett seconded the motion, which was heartily passed.

Mr. Philip G. G. Moon thanked the proprietors very cordially on behalf of the officers and workmen at Bournemouth. Although, he said, the difficulties had not been less, fortunately the loyal and efficient co-operation of everyone had enabled them to successfully surmount the difficulties up to the present. They were a very happy family at Bournemouth; and they felt they had an extremely appreciative Board and an extremely appreciative set of proprietors. There was nothing that enabled one to work with more zeal than the knowledge that one's efforts were appreciated; it turned what might be a very trying business into a labour of love. The loss of their ship the "Corbet Woodall" was felt very much by them at Bournemouth. They got to like the old ship; and they knew only too well how much they owed to her successful running during the first two years of the war. Even this cloud had a silver lining. Better railway deliveries commenced almost simultaneously with the loss of the boat, and they had been able to get quite a good stock of coal together; and, so far as they could judge at the present moment, the winter supplies were not going to present too much difficulty. With regard to their friends at the front, they had some 300 of their people serving with the Colours. He had heard from Lieut.-Col. Woodall; and with him it was still the same story. He was still carrying-on well, but still longing to get home and to his old duties again. They had unfortunately lost seven of their men. One of their men—their Bournemouth showroom manager, Mr. Richardson—was now a captain, and had received the Military Cross, of which they were all very proud. As to the co-partnership minimum bonus and pension scheme, he was sure it would do more than anything that had happened in the past to bind their workers to the Company with the bonds of mutual good fellowship in perhaps the troubled time that labour might have to pass through in the years to come.

Mr. Plumb said that it was always a pleasure to rise in response to a vote of thanks to one self and one's staff. The difficulties of the situation fell more upon Mr. Moon than himself. But the accounts that had been submitted showed they had intelligently anticipated what the effect of the rise of coal, oil, wages, &c., would be. They had had to budget in advance. They did not want to raise the price of gas to inflate the profits, and probably have to pay excess profits tax. On the other hand, they did not want to leave the price of gas alone until they showed a big loss. If they took the accounts presented that day, he thought they would compare very favourably with the accounts of all gas companies over the whole of the country. They had had to increase the price by 6d.; and they believed this would cover the increased costs. He was sanguine the price would be reduced as quickly as possible, and consequently the dividend to the proprietors would be proportionately increased again.

Proposed by Mr. Barrett, seconded by Mr. Oke, and supported by Mr. Charles Webb, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman responded on behalf of his colleagues and himself; and this concluded the meeting.

PORTSEA ISLAND GAS LIGHT COMPANY.

Moving the adoption of the report reproduced on p. 290 of the "Journal" for the 14th inst., at the recent half-yearly meeting of the Company, Mr. R. Edgcombe Hellyer (the Chairman) said that the total quantity of gas sold in the six months ended June 30 was 745 million c.ft., which was 23 millions in excess of the quantity sold during the corresponding six months last year. So that, notwithstanding the abnormal and adverse condition, the growth of the business continued, and the demand for gas was well sustained. The profits for the half year ended December last were insufficient to pay the dividend by £8987; and the carry-forward was consequently reduced by this amount. In commenting on the accounts at the February meeting, he said that, owing to the further increase in the price of coal and oil, the deficiency would be greater for the then current half year—*i.e.*, to June 30—but that the Directors would meet the shortage out of the reserves, rather than penalize the consumers and shareholders by increasing the price of gas before they were compelled to do so. In the half year ended June, 1916, the gross profits were £20,033. In the half year ended June, 1917, instead of a profit, an actual loss of £12,723 was incurred, a difference of £32,756 between the two half years. This result was clearly foreseen by the Directors; so that it need give the shareholders no anxiety as to the Company's financial stability. On the contrary, it was the thoroughly sound financial condition which justified the Directors in deciding to bear the loss rather than increase the price of gas. To meet this loss, and to provide for the dividend at the statutory rates, the carry-forward of £10,356 had been entirely absorbed, and £20,373 had been transferred for the reserve fund, which had been further reduced by £5853 depreciation in the value of investments. In comparing these different items of expenditure with last year's charges, it must be borne in mind that an additional 63 million c.ft. of gas had been made durnig the period. Apart from wages an additional £35,353 was spent on coal and oil; but only £4604 extra was obtained from residual products. The net increased cost of raw material was therefore £30,749; and £5417 more was paid in salaries and wages, making together £36,166. The increased quantity of gas sold to private consumers produced an extra £5580; but owing to the temporary discontinuance of the majority of the street-lamps, the receipts from public sources were £943 less. The position was carefully reviewed in April; and the estimate then made was surprisingly near the actual result of the half-year's working. It was estimated that the difference would be about £11,000; and as a matter of fact it was just over £12,000, which was accounted for, to a great extent, by the quantity of gas sent out. It was clearly seen that the serious increase in the cost of coal and oil, and the general advance in wages, would necessitate an increase of not less than 8d. per 1000 c.ft. in the price of gas; and this advance had been made to all classes of consumers throughout the district, as from the end of the June quarter. The cause of the increase appeared to have been fully understood and the necessity for it recognized by the consumers generally. Deliveries of coal and oil during the half year had been more regular; and careful attention was being given to the winter's requirements. Steps were being taken to deal with complaints as to an insufficient pressure of gas in the more remote localities; and as far back as November last, plant was ordered to deal with this. It was now in operation; and it was hoped to be able to provide a pressure adequate for all purposes throughout the whole area of supply. The question of labour was an ever-present anxiety; and the thanks of the Company were due to the officers and staff and employees generally. The women workers, in particular, were deserving of praise for the manner in which they had assisted the management; and in meeting the many difficulties they proved their adaptability.

The report and accounts having been adopted, Dr. Beddow, in moving a vote of thanks to the Chairman for presiding, to the Secretary (Mr. H. A. Stibbs, F.C.I.S.), to the Engineer (Mr. J. D. Ashworth), and to the staff generally, complimented them on the fact that the quality of the gas was even better than was required of them, it being of 520 B.Th.U., whereas only 500 B.Th.U. was necessary.

GAS STOKERS' WAGES AT STOCKPORT.

Threat to Stop Carbonization on Sundays.

Reference was made in the "Journal" of Aug. 14 [p. 290] to the trouble which had arisen with the stokers at the Stockport Corporation Gas-Works in regard to their hours of working and rates of pay. This has culminated in the men addressing the following communication to Mr. S. Meunier, the Engineer and Manager of the undertaking, from which it will be gathered that they are dissatisfied with the recent award of the Arbitrator (His Honour Judge Willis, K.C.). An accompanying note, addressed to the Chairman (Mr. Jacob Winter, J.P.) and members of the Gas Department, stated, *inter alia*, that: "All other measures taken by the men to secure a living wage for six days have failed, and they hold that their Sunday labour is a favour to the Department and must cease. They insist that neither cleric, lawyer, nor custom can compel them to work on the Sabbath; and unless their

request is granted, they will stop Sunday duty, entailing a loss to the rates."

The text of the men's letter shows the document to be a most remarkable one:

A request from the stokers to the Gas Committee for 2s. per day increase in wages, and time-and-a-half after 12 o'clock noon on Saturdays, was submitted to the Town Clerk on July 6 last. A condition asked was that such increases be paid from the date of application. This request was submitted to London on the advice of our delegates, who attended by invitation of the Ministry of Munitions.

Apparently our request has been ignored by this Shylock Committee, as no official answer has been received by the stokers. As a protest, we have decided to inform yourself and this antiquated Committee that we have decided to discontinue the Sunday morning and Sunday afternoon shifts of work after Aug. 31 unless our modest request is agreed to. At the meeting we had union, non-union, regular, and casual stokers present. Therefore the Committee can choose the lesser of two evils—a few shillings more for their workpeople, or unproductive and cooling retorts during Sundays.

The decision on our part is for the following, among other, reasons:

1.—A small bonus and its unsatisfactory application.
2.—The threats of prosecution, &c., uttered by the Chairman of the Gas Committee at the last Council meeting against a respectable and hard-working company of workmen.
3.—We find that an honorarium of £200 is freely voted to an official (members of the Gas Committee also voting for same) who receives £600 salary, or £11 11s. a week, work or play, and who has done no more than the gas stoker—*i.e.*, his duty.
4.—Misrepresentations before the Arbitrator as to the stokers' wages by the Engineer, and at the last Council meeting by the Chairman of the Gas Committee. We are prepared to disprove figures by fact in each instance.
5.—We are "fed up" with working almost every week-end, and find that a full plate of work is served out on Sunday shifts. Sunday labour usually is an accommodation to an employer, with a reduction of work as an appreciation to the worker. Not so with the Gas Department.
6.—More work, hotter and heavier work than applies in other gas-works.

Therefore, unless our request is acceded to by the Gas Committee, a stoppage of sixteen hours in gas production will take place on Sundays after this month.

WORKMEN'S COMPENSATION (WAR ADDITION) ACT.

This Act, which received the Royal Assent before the adjournment of Parliament last week, is entitled: "An Act to provide for an addition during the present war and a period of six months thereafter to the amount of the compensation payable under the Workmen's Compensation Act, 1906, in cases of total incapacity." It comes into force on Sept. 1.

Clause 1—"Temporary increase of amount of compensation in cases of total incapacity—is as follows:

(1) Where any workman is at any time during the period for which this Act continues in force entitled during total incapacity to a weekly payment by way of compensation under the Workmen's Compensation Act, 1906, he shall, whether the incapacity arose before or after the commencement of this Act, be entitled to receive from the person liable to pay the compensation, by way of addition to each such weekly payment payable in respect of any week within the said period, a sum equal to one-fourth of the amount of that payment.

(2) The additional weekly sum payable under this Act shall be deemed to be part of the weekly payment under the Workmen's Compensation Act, 1906, for the purposes of—

(*a*) The provisions relating to the recovery of weekly payments;
(*b*) Any order made with respect to payment into Court of a weekly payment;
(*c*) The provisions of paragraph (19) of the First Schedule to the Workmen's Compensation Act, 1906 (which prohibits the assignment, &c., of weekly payments);

and shall, notwithstanding that the liability to make the said weekly payment is redeemed subsequently to the commencement of this Act, continue to be payable in the same manner as if that liability had not been redeemed.

By clause 2—Provision in respect to certified schemes—"where an employer is liable to pay benefits under a scheme certified by the Registrar of Friendly Societies under section three of the Workmen's Compensation Act, 1906, the Registrar may direct that workmen who are at any time during the period for which this Act continues in force entitled to benefits under the scheme as on account of total incapacity shall receive such additional benefit as is specified by the Registrar in the direction as being in his opinion of equivalent value to the additional sum payable under the foregoing provisions of this Act."

GAS-WORKERS' DISPUTES IN AUSTRALASIA.

Reference was made in the last issue of the "Journal" to a "stop-work" meeting which was to be held in Melbourne by the members of the Federated Gas-Workers' Union; and newspaper reports since received show that there has been agitation also in other places.

There was a temporary stoppage of work by a section of the employees of the Australian Gas Light Company, at Mortlake. The trouble was owing to an order issued to a number of foremen, that in future they would have to report certain breakages on the part of the employees in the retort-house. The foremen, however, who are members of the Gas Employees' Union, contended that this was tantamount to syping on their fellow unionists; and they would not obey the instruction. Consequently, they were suspended. The men employed in the retort-house then refused to turn-to unless the dismissed foremen were re-instated. Mr. Rawlins, the Secretary of the Union, heard of the trouble, and met the Engineer, so as to endeavour to arrive at a settlement, and thus remove any danger of the interruption of the Sydney gas supply. The effort was successful; and the suspended foremen returned to work; the question of breakages being referred to a conference. The dispute lasted about three hours.

In the case of Melbourne, it was subsequently decided not to hold the "stop-work" meeting of the members of the Federated Gas-Workers' Union, in connection with the delay of certain gas companies in paying the back-money increased rates awarded by Mr. Justice Higgins from November, 1915. A conference was held between the Registrar of the Commonwealth Arbitration Court (Mr. A. M. Stewart), Mr. P. C. Holmes Hunt, representing the Gas Companies concerned, and Mr. C. Crofts, of the Gas Employees' Union. After discussion, it was asked by the Registrar that the employees should hold a meeting, at which a suggestion should be submitted that the notice to hold the "stop-work" meeting should be withdrawn, and that the representatives of the parties should meet the Registrar again. Mr. Croft acceded to the Registrar's request; and the Executive of the Union considered the matter. At the conclusion of the meeting, it was announced that it had been decided to abandon the "stop-work" meeting. At a later conference convened by the Registrar, a definite understanding was arrived at on the chief matters in dispute. The Gas Companies undertook to pay the retrospective rates awarded by the 15th of June, with the exception of the Adelaide Gas Company, who agreed to pay them on June 29. The questions that the Companies claim were not in dispute prior to December last it was arranged should be referred to Mr. Justice Higgins at the earliest date possible.

A wages dispute of a similar character at Hobart, Tasmania, resulted in 55 men coming out on strike; and although the office staff worked well to maintain a supply of gas, both heating and lighting consumers had temporarily to resort to other means of meeting their requirements. However, the inconvenience did not last long; a satisfactory settlement of the trouble being reached at a conference between the Directors of the Company and representatives of the employees.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Aug.* 27.

In the London tar products market, there is no particular change to record. There are a considerable number of inquiries for pitch, and the position is very firm. The export price is not below 45s. per ton net in bulk at makers' works. Makers are not anxious sellers. A certain number of shipments continue to be made. In ordinary London creosote, the position remains unaltered; all transactions being regulated by the Government. Solvent naphtha continues steady at 2s. 2d. to 2s. 3d. per gallon naked. Anthracene, 48-50 p.ct., is 6d. per unit, casks free, both at makers' works.

There is an increasing demand for sulphate of ammonia for forward delivery for home agricultural purposes at the Government prices.

Tar Products in the Provinces.

Aug. 27.

There is no alteration in the markets for tar products. Business has again been done in pitch in London in the neighbourhood of 50s. to 52s. 6d. per ton. Solvent naphtha is still very firm, and the demand for prompt and forward delivery is consistent.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct. North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Trade in tar products generally is quiet; but the improvement in the position of pitch continues, and holders are no longer ready to let it go at absurdly low prices. A very good number of inquiries are being received from the Continent, and the London price remains firm at about 45s. net per ton *ex* makers' works for export. Shipments are being continued throughout the summer. Provincial values maintain a hardening tendency, and probably some concerted action on the part of producers would enable them to obtain some of the export trade at a further advance in provincial prices. The contracting period for next season's requirements is practically at hand, and for local pitch f.o.b. at North-East ports 25s. per ton is indicated for the new season beginning in October, which compares with about 17s. 6d. for the past season—a very marked advance. Probably, however, business could be effected at slightly less than this quotation. Creosote is still in the same position—nothing can be done without licences, and these are few and far between. The output is required for national purposes; but it is not yet known at what prices the Government will take over supplies. Meanwhile, as a substitute for creosote in the preservation of timber, a process has been patented to make available the naphthalene containing ingredients remaining from the alkaline treatment of light and heavy creosote oils in the production of liquid fuel for internal combustion engines. The idea is not new, of course; but the latest process lays claim to simplicity and low cost. Little interest is shown in cresylic acid, in spite of the season and the absence of many other disinfectant materials; the market being rather flat at 2s. 4d. to 2s. 7d. Naphthalenes show no change. Export licences are still available for refined sorts. The supply of both crude and refined is small, and a scarcity is looked for. There is a scarcity also of solvent naphtha, which has

developed quite a strong one, and higher quotations are expected. It is a matter of some surprise that prices have been so moderate for so long. Heavy naphtha has also improved; prices ranging from 1s. 6d. to 1s. 9d. per gallon in casks, according to quality. The position of benzol remains unchanged. The 90's show no advance upon the price of July, 1914; whereas toluol is over 100 p.ct. higher. Trade benzol is undoubtedly worth 2s. a gallon at the works. Aniline oil is quiet and dull. Quotations are about as follows:

Aniline Oil (pure): 1s. 3d. per gallon.

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 26s., Midlands 23s. 6d., North 24s. per ton, *ex* works.

Pitch: London 47s. 6d. f.o.b.; East Coast 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 17s. 6d. to 18s. 6d. f.a.s., Clyde 20s. per ton. New Season: Provinces 25s.

Solvent Naphtha: Naked London 90-190 % 1s. 6d. to 1s. 8d.; North 1s. 4d. to 1s. 6d. per gallon; 90-160 % naked London 2s. 3d. to 2s. 4d.; North 1s. 11d. to 2s. 2d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8¾d.; North 6¾d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95 %, 2s. 5d.; 97-99 %, 2s. 6d.-2s. 7d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

The position here is practically without change; the bulk of production going into home consumption. As a very great privilege, a few licences have been issued for export to British possessions. The state of the export market, however, may be gauged by the monthly trade returns, which indicate that only 2874 tons of sulphate were exported during July, compared with 20,565 tons in July, 1916; while the total for the seven months of the current year is under 40,000 tons, contrasted with 148,445 tons and 185,595 tons for the similar periods in 1916 and 1915 respectively. The average f.o.b. value for the July shipments was £20 7s. per ton, bags included; whereas the latest quotations for export, arranged by the Sulphate of Ammonia Association in London, are nearer £24 per ton. The home demand is fairly heavy, both for immediate use and forward delivery, at the prices officially fixed. The Corn Production Bill has received the Royal Assent, and sulphate makers feel they have a real grievance in that their interests have not been protected in the Bill by the fixation of values. This, and the regulations relating to payment and delivery, are still tending to retard business. Manufacturers are hoping to obtain fairer terms from the Government; but in many quarters it is believed to be a vain hope. In South Wales, a scarcity of nitrate of soda and the likelihood of very short supplies for some time has led to a heavy demand for sulphate, which is an absolutely efficient substitute. Coke-ovens are working well, and outputs should easily be increased. In America, prices continue high, although production is increasing rapidly. The product for 1917 is likely to greatly exceed that for last year. Makers there are attending to previously-made contracts with old customers, and supplies available from these sources are only occasional and quite limited.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 15s. January-May, £16 7s. 6d. —all delivered; 10s. less at makers' works.

Export (under licence only): London, Liverpool, Leith, Hull, £23 10s. to £24 f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade shows on the whole a slightly better tone; the demand being fuller both for home and export, though it has not had much effect on the prices. In the steam coal trade, there are more inquiries from neutral countries. Best Northumbrian steams are steady at 30s. per ton f.o.b.; second-class qualities are from 25s. 6d. to 27s., according to kind; and steam smalls are still plentiful at from 18s. 6d. to 20s. 6d. Very high freights are quoted where tonnage can be got. In the gas coal trade, there is now a steady growth in the consumption; and this, and the heavy demand for coking coal, makes Durham fuel generally firm. Best gas coals are 25s. per ton f.o.b.; second-class descriptions are quiet at about 23s. 6d.; and for "Wear specials" the inquiry is good—from 27s. to 29s. being the current price. The rate of freight on gas coal is shown by 15s. to 15s. 6d., from the Tyne ports to London. Production of coal is fairly good, and is well taken up, as the deliveries on the long contracts continue full. The rate of wages at the mines seems stationary, and does not follow freely the variations in the selling prices of the product. In the coke trade, business is brisk and prices are maintained, despite enlarging output. Good gas coke is from 29s. to 31s. per ton f.o.b., with a freight of 45s. for Dunkirk and other ports in the north of France.

Wolverhampton Gas Company.—The accounts of the Company for the past half year show a net profit of £14,101. This, added to the balance brought forward, enables the Directors to recommend payment of dividends of 3 p.ct. upon the preference stock, 5 p.ct. upon the consolidated stock, and 3 p.ct. upon the new ordinary stock, less income-tax. They further recommend that £559, interest for the half year, be placed to the credit of the reserve fund, and £71 like interest to the credit of the insurance fund, and that the balance of £45,338 be carried forward.

Fatality at the Beckton Gas-Works.

Mr. G. E. Hillary, Coroner of the Borough of West Ham, last Friday held an inquiry into the death of Charles Phillips, a labourer 61 years of age, employed by the Gas Light & Coke Company, who was killed on the 21st inst. while unloading coal-trucks into barges at one of the piers at the Beckton works. It appeared that the trucks were continuously being shunted by means of a capstan; and deceased was pinned between the buffers of two of the trucks. In answer to Mr. Beesly Robinson (who appeared for the Company), a fellow workman of the deceased, named Monk, said he had understood since he was quite a lad that it was a rule of the Company that workmen were not to pass under or between moving vehicles, and that if they did so it was at their own risk. At the time deceased was crossing, the buffers were fifteen inches apart; and he knew that continuous shunting was going on. Trucks could not be moved until they were unscotched. If deceased had gone round the end of one of the trucks, he would have been safe. Replying to the Government Inspector, Monk said that, as the trucks were being continuously shunted, it was dangerous to go through such a narrow space. Deceased was removed to the Seamen's Hospital, where it was found that fractured ribs on the right side had penetrated the lung, and caused death by hemorrhage. The Coroner remarked that deceased apparently knew the risk he was running, and, as many people did, elected to incur the danger of the short cut, though there was plenty of room to go round. The verdict was in accordance with the evidence.

Waterford Gas Company.—The City of Waterford Gas Company announce a dividend of 5 p.ct., and carry-forward of £7952. A year ago the dividend was 6½ p.ct., and the carry-forward £6802.

Bridport Gas Company, Ltd.—At the annual meeting of the Company, the Directors reported that, in common with other undertakings, owing to the present high price of coal and labour, it was found necessary to make a further increase of 4d. per 1000 c.ft. in the price of gas as from the 1st ult. Dividends, less tax, were declared of 5½ p.ct. on the ordinary shares and 5 p.ct. on the preference shares.

Hathersage Gas Company.—The report of the Directors of the Hathersage and District Gas Company for the past year shows, after providing for depreciation, a profit of £1481, while £329 was brought forward. Deducting the interim dividend, there was £1209 for disposal. The Directors recommend a dividend for the half year of 9d. per share, making 6½ p.ct. for the year (less tax), the placing of £100 to reserve, and the carrying forward of £518.

Salisbury Gas Light & Coke Company.—Mr. George Fullford, J.P. (the Chairman), presided at the annual meeting of the Company, and, in moving the adoption of the report and the payment of the full statutory dividends, said they had passed through a very anxious and difficult year. Coal, oil, and all commodities had been exceptionally dear, and oil difficult to obtain. Trade, on the other hand, had been very good; and he was happy to say they could still sell gas at the old figure. The past six months showed an increased output of gas of 14 p.ct., thanks to their capable and energetic Engineer and Manager (Mr. W. Fielden). Like all other businesses, they were working with a sadly depleted staff, and any further reduction in their manufacturing department would imperil the supply, and prevent them fulfilling their statutory obligations.

Barrow Gas Workers and the Tribunal.—At the Barrow Military Appeal Tribunal last Wednesday, the Special Military Representative appealed against several exemptions which had previously been agreed upon by the Local Military Representative and the Local Advisory Committee; and among the number were those of three men employed as labourers at the Barrow Corporation Gas-Works. Mr. F. Chadderton (the Gas Manager) appeared to support the exemptions, and pointed out the difficulties of getting other men. In addition, the Local Advisory Committee wrote: "We consider that the Corporation departments should not be further depleted of men, having already lost so many. Substitute labourers for the gas-works or for the health departments are practically impossible to obtain. We also have in mind the importance of the production of gas from a national point of view, as regards the manufacture of explosives—not to speak of the domestic needs of the town and those of Messrs. Vickers." The Tribunal confirmed the exemptions; the Mayor pointing out, however, that they wished to impress upon Mr. Chadderton the importance of trying to get other men not of military age to do the work.

A Hastings Gas-Worker's Certificate Withdrawn.—At a recent meeting of the Hastings Military Exemptions Tribunal Mr. Charles F. Botley, the Engineer of the Hastings and St. Leonards Gas Company, applied for exemption in the case of William A. Hodd, aged 24, a fitter and driver of machinery in the employ of the Company. In reply to the Military Representative, Mr. Botley said the man had done his present work for nearly three years—having been previously trained for it. There were only two men engaged on this work, which was carried on night and day. If this man was taken, something serious might happen. They could only now drag on with the work in the best way they could. The man was just under 25 years of age, which would make him exempt. His certificate had been withdrawn with the view of finding a substitute; but it was not possible for this to be done. As to the man being A1, it was essential that a man engaged day and night all the year round must be of good health. Mr. Botley submitted that it was in the national interest that the man should be left, as he was essential to the work, as they were already "on the rocks." Unless they had the men to carry on, the Company could not fulfil their obligations. If a substitute could be found, he would be prepared to let the man go at once. It ought to be made clear to the public that it was through no fault of the Company that the present condition of things was so bad. They were trying to do their duty; but they could not do so if they were to be penalized by their men being taken. The gas industry was of more importance than ever to-day for the prosecution of the war. It was of vital consequence. Three months' exemption was granted; the Tribunal expressing the hope that a substitute might be found. If one was forthcoming before that time, Mr. Botley said he would be prepared to let the man go.

Navan Gas Contract.—At a meeting of the Navan (co. Meath) Urban District Council, the Gas Company intimated that they could not make any reduction in the price quoted for gas for public lighting—viz., 7s. 6d. per 1000 c.ft. It was decided that the tender should be accepted.

Increased Consumption at Harrow.—It is stated in the report of the Directors of the Harrow and Stanmore Gas Company, for the half year ended June 30, which will be submitted at the meeting next Monday, that the sale of gas was 16·06 p.ct. more than in the corresponding period of the previous year. This increase the Company were able satisfactorily to meet.

Trouble at the Birkenhead Gas-Works.—Early in the morning on Monday of last week, all the men engaged on the Birkenhead Corporation Gas-Works came out on strike; but after discussion with the officials, they returned to work at breakfast time, pending a meeting of the Gas Committee the same afternoon to discuss their further claim for a 3s. increase in wages. Later, representatives of the workers met the Gas Committee and the Wages Committee, and made certain proposals. It was arranged that a joint deputation should ask the Chief Industrial Commissioner to receive them.

Wages of Birmingham Gas-Fitters.—The Committee on Production have made an award in respect of the application for an advance of wages made by the Gas-Fitters' Trade Association on behalf of their members employed by the Birmingham Corporation Gas Department and firms belonging to the Birmingham and District Master Gas-Fitters' Association. Since the outbreak of war, the men concerned have received an advance of 1½d. per hour, and an advance of 3s. per week conditional upon a certain number of hours being worked. The Committee state their finding is that, as from the beginning of the first full pay day following the date of their award, the men concerned shall receive an advance of 1d. per hour—such increase to be regarded as war wages, and recognized as due to, and dependent on, the existence of the abnormal conditions now prevailing in consequence of the war.

Defective Lighting of Provincial Towns.—The Launceston Town Council discussed last week the question of public lighting, and decided that the Lighting Committee should arrange to have lighted during the winter as many lamps as the police would permit. Mr. M'Donald said that in London there was no stint of light, and he had been able to read a newspaper under a lamp in the very heart of the city—a thing they could not do in Launceston. In his opinion, the police were making a mistake in so severely restricting the lighting; and if the place could not get more light, the Council ought to consult some higher authority than the police. It was dangerous to have so few lights in their narrow streets. The Town Clerk pointed out that a certain amount of legal responsibility rested on the Council in the matter. The High Court had held that local authorities must see that dangerous places were properly lighted, and actions had been brought against local bodies for not lighting them properly.

Padiham and Blue Water Gas.—In a report to his Committee, Mr. A. T. Harrison, the Gas Engineer to the Padiham District Council, remarks that experiments had been made with the production of blue water gas in the vertical retorts, and these had been very satisfactory; an increased production of over 20 p.ct. of gas per ton of coal being obtained, with practically no reduction in the calorific value. The experiments were made with a view to the saving of coal.

Burton Gas-Workers' Notices.—The Burton gas workers, to the number of over 80, have given in their notices to the Corporation. The notices will take effect on Sept. 7 next. This action is the outcome of the dispute between the gas workers and the Corporation on the question of the recent increase of wages, which were not made retrospective, and as the result of the failure of the efforts to persuade the Local Authority to submit the matter to arbitration. The gas workers, who are controlled by the regulations of the Ministry of Munitions, are compelled to give three weeks' notice; while the general labourers of the Corporation, who are also concerned in the dispute, have to give only a week's notice. It is expected, however, that efforts will be made to prevent a strike.

Weymouth Consumers' Gas Company.—The stockholders were congratulated upon the continued vitality of the undertaking by the Chairman (Mr. J. G. Rowe) at the half-yearly meeting of the Company last Thursday. In the period under review, he said, the demand for gas had been—though only slightly—again on the up-grade. Compared with the half year immediately before the outbreak of war, the sale of gas in the past six months showed an increase of over 4 million c.ft. As to the financial results of the past half year, there was an increase of £83 in the gas-rental; and the returns from residual products were up by £546. There was a profit of £2476, which was about £100 more than was required to meet interest and dividend charges. Coal was costing over 9s. per ton more now than it did just before the war. The report was adopted; and a dividend for the half year on the ordinary stock at the maximum rate of 5 p.ct. per annum, less income-tax, was declared.

Gas Panic in Berlin.—Under this heading, "The Times" last Thursday published the following: There is great excitement in Berlin over the announcement of drastic restrictions of the consumption of gas. All over Germany the consumption of gas is to be reduced by 10 p.ct. of the monthly consumption a year ago; but in Berlin new orders have been issued which are calculated to mean a reduction by one-half of the gas consumption of every ordinary household. It is long since any official order has been so bitterly attacked. The newspapers are full of violent articles and letters, which say that the situation next winter will be intolerable. The excitement has been increased by preliminary announcements of drastic measures to reduce the amount of coal used in "central heating" of all buildings. It is proposed that only a certain number of rooms in every house shall be heated; that there shall be no heating until a certain low temperature has been reached; and that many public buildings shall not be heated at all.

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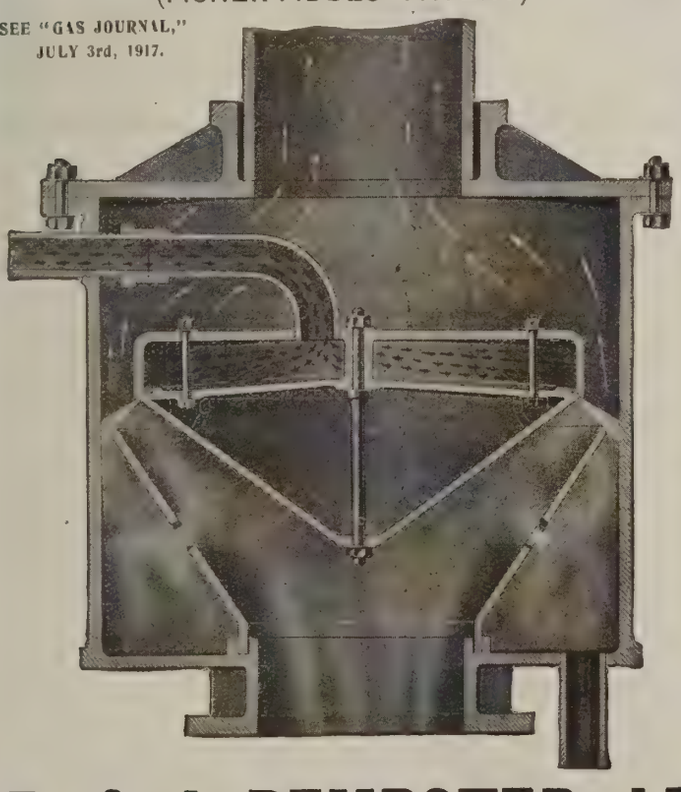

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Wanganui (N.Z.) Municipal Gas-Works.

That the municipalization of the Wanganui Gas-Works has proved highly beneficial to the ratepayers and the public is, says Mr. G. Murch (the Town Clerk), in his report for the year ended last March, amply demonstrated by a study of the following figures. Not only has the undertaking supplied gas at a price lower than that ruling in some of the large centres in the Dominion, but it has contributed over £30,000 for the relief of rates, besides providing interest on the capital employed and substantial sums for the repayment of such capital. Transferred to general account for the relief of rates, £31,900; interest on capital employed, £37,075; transferred to sinking funds, £16,282; transferred to plant account, £22,795. The total amount borrowed and expended on the works was £100,000; but by the application of the accrued sinking funds on a portion of the loans, this was, in November, 1914, reduced to £88,590. The accrued sinking fund for repayment of loans at maturity stands at £9234. The revenue account for the period under review shows that the usual steady progress has been maintained; but the increased cost of coal and labour, together with a larger expenditure on repairs and maintenance, new plant, gas-fittings, &c., more than accounts for the additional revenue as compared with the previous year, reducing the credit balance from £1038 to £100. Out of the year's profits, a sum of £4000 has been transferred for the relief of the rates.

Wellingborough Gas Light Company, Ltd.—A very satisfactory statement of accounts for the half year ended June 30 was presented at the meeting of the Company yesterday. The Directors reported that the quantity of gas sold during this period was nearly 12 p.ct. more than for the corresponding half of 1916. The crude benzol plant, erected at the request of the Ministry of Munitions, has been completed, and is working to the satisfaction of the Ministry. Since the beginning of the war, 27 of the Company's employees have joined His Majesty's forces; and unhappily one-third of this number have been killed or are missing. Dividends for the six months were recommended, less income-tax, of 6⅝ p.ct. on the original shares, and 5⅛ p.ct. on the additional shares.

Kettering Gas Company.—At the half-yearly meeting of the Company on the 14th inst., the Directors reported that the works were being maintained as far as possible in an efficient state; and the general working of the Company was being carried on to their satisfaction. They regretted that, owing to the continued increase in working costs, they had been reluctantly compelled to advance the price of gas by 3d. per 1000 c.ft., as from the commencement of the current quarter. Mr. J. T. Stockburn, J.P., in moving the adoption of the report, pointed out they had only increased the price of gas by 3d., whereas some companies had done so by as much as 8d. or 9d. The payment of dividends at the rates of 11¼ p.ct. per annum on the "A" stock, 8¼ p.ct. on the "B" stock, and 5⅝ p.ct. on the "C" stock were agreed to.

Australian Gas Light Company's Large Holder.

Newspapers lately to hand from that part of the world contain accounts of the turning of gas into the big holder that has been erected at the Mortlake Station of the Australian Gas Light Company. After an inspection of the works by the Directors and officials of the Company, the Engineer (Mr. Andrew Wilson) reported that the holder had been completed, and asked the Chairman (Mr. G. J. Cohen) to put it into commission by turning gas into it. This ceremony was followed by luncheon, during which the Chairman said that, owing to the rapid growth of the Company's business, it was considered in 1912 that more storage accommodation should be provided at the works, to secure a certainty of supply. Designs for a holder on modern lines were prepared, and tenders for the supply of the necessary materials and for the construction of the tank were called for early in 1913. The successful tenderers for the supply of the materials were Messrs. C. & W. Walker, Ltd., of Donnington, and for the construction of the tank Messrs. W. Solomon and Sons, of Sydney. The first sod was turned in May, 1913; so that the holder had taken exactly four years to construct. So expeditiously did the contractors for the tank proceed with their work that they created a world's record in rock excavation. The contractors for the supply of the materials also proceeded with their part of the work in a like manner; the bulk of the materials being shipped before war broke out, and the whole before the submarine menace threatened shipping to any great extent. They also carried out their contract so conscientiously that no difficulty of any kind was experienced in the erection, which was carried out by the Company with the assistance of three of the contractors' staff. The holder was the second largest in the world, having a total capacity of 12¾ million c.ft. and a working capacity of 12 million c.ft. The total cost of the holder had been £188,000. It could safely be said that the whole structure ranked among the finest examples of modern gas engineering, and reflected great credit on all concerned in its erection.

Stirling Coal Area.—Exception is taken by the Stirling Gas Company and the Burgh Electrical Engineer to the fact that, under the Transport of Coal Order, Stirling is placed in Area No. 19, which includes Fife, Clackmannan, and the districts north of the Forth, but excludes Millhall, Fallin, Bannockburn, lying quite close to the town, and the other Stirlingshire coalfields in Area No. 18. They contend that Stirling should be included in Area No. 18. The Coal Controller was asked by the Town Clerk if it would be allowable under the Order to cart coal by road from the collieries in the neighbourhood of Stirling into the burgh; and he replied that, as the Order does not provide for coal conveyed otherwise than by public railway from the colliery, the carting from one district into another is allowed. The Secretary of the District Coal and Coke Supplies Committee for Scotland has also written to the Town Clerk explaining that he has recommended the Controller to put Stirling within Area No. 18, in view of the fact that it is situated south of the River Forth, which should have been the dividing-line between Areas Nos. 18 and 19.

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MANCHESTER. NOTTINGHAM.

Dover Gas Company.—Next Monday the half-yearly meeting of the Company will be held. The Directors' report states that, in view of the "exorbitant cost of transport" to and from the works, they decided to construct a railway siding. It is hoped that this work, which is now in hand, will soon be completed; and the Board confidently anticipate that its use will result in a considerable reduction in the cost of all railborne traffic. The net profits of the half year to June amounted to £1837. The Directors recommend a dividend at the rate of 7½ p.ct. per annum, less income-tax, which will reduce the undivided profits by £975.

Kingston (Surrey) Gas Company.—At the half-yearly meeting of this Company on the 15th inst., under the chairmanship of Mr. C. E. Nuthall, J.P., the report presented by the Directors showed that there had been an increase in the sales of gas to private consumers of more than 25 million c.ft. over the corresponding period of 1916. It was resolved that a dividend at the rate of 5 p.ct. per annum for the six months to June be paid on the consolidated ordinary stock of the Company. The meeting concluded with a cordial vote of confidence and of thanks to the Chairman and Directors, the Manager (Mr. H. W. Packham), Secretary (Mr. C. S. Sherrard), and staff generally, for the satisfactory manner in which the affairs of the Company had been managed and the work done during the past half year.

Good Service Rewarded at Bangor.—In the course of some brief notes on p. 332 of last week's "JOURNAL" regarding the Bangor (co. Down) Urban District Council gas undertaking, the good work done by Mr. Barker Mitchell, the Manager, during the sixteen years he has held his appointment, was commented upon. It is a pleasure to learn that appreciation of Mr. Mitchell's good services has been marked in a tangible manner by his Council, who have increased his salary £50 per annum.

Woking District Gas Company.—The receipts of the Company from sales of gas in the six months ended June 30 show an increase of 19·23 p.ct. over the corresponding period of 1916, and those from residual products an increase of 8·39 p.ct. The revenue for the half year has been £12,137, and the expenses on revenue account £9786, leaving a net profit of £2351 to be carried to profit and loss account, to which must be added the balance brought forward of £1961. After making the usual charges for interest, &c., and writing off £300 part cost of the Special Act, there remains an available balance at the credit of the profit and loss account of £3554. The Directors will recommend at next Monday's meeting the payment of dividends on the preference stock at the rate of 5 p.ct. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ p.ct. per annum, which will absorb £1739, leaving £1815 to be carried forward.

STOCK MARKET REPORT.

THE prevailing tone of things in general on the Stock Exchange was quite cheerful, although, of course, there was no increase in activity to be expected. Even as it was, the leading departments scarcely had their fair share of the business; the bulk of it being claimed by the various undertakings which collectively make up the Miscellaneous group. Despatches from the fronts were again the chief factor in imparting strength to the markets. The withdrawal of the railway engineers and firemen's strike notice also afforded relief.

The gilt-edged market was rather upset by more Australian loan issues, and War Loans, which had been rising freely, came in for some realization of profits. In regard to the prospect of a new loan, the chances of a premium bond issue were much discussed with increasing expectation that its sentimental opponents will be overborne. Colonial issues were quite dull. Home Rails were unsettled—depressed at first by the eight hours' demand, then relieved by its retraction, and then again depressed by a substituted demand for a largely increased wage. Americans were easy; but Argentines were steady.

In the Foreign Market, French and Russian made advances, checked towards the close by some profit snatching. Mexican, Chinese, and Japanese were similarly treated. The South African Market was firm. The Miscellaneous group were bright and active. Conspicuous among these were Nitrates and Food concerns. Rubber and Oil were strong and in brisk demand, and Breweries had some firm lines.

Business in the Gas Market made up a tolerably good aggregate for the time of year, helped by transactions in some of the issues which are not frequently in evidence. The tone, too, was decidedly firm, and all changes of quotation were in the upward direction. Primitivas were most noticeable in this respect, and were actively dealt in. Other gas undertakings that made advances were Gas Light and Coke, Cape Town, Chester, and Liverpool.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 52½, Brentford "A" 79¾, 80, ditto "B" 77¾, 78, Brighton and Hove "A" 104, Commercial 4 p.ct. 72, Gas Light ordinary 68, 68⅝, 68¾, 69, ditto preference 72, Imperial Continental 79½, 80, Primitiva 36s., 36s. 6d., ditto preference 57s. 6d., 60s., South Metropolitan debenture 55⅝, 56, South Suburban preference 75½, 76. On Tuesday, Brentford "A" 79¾, 80, British 33½, 33⅝, Commercial 4 p.ct. 72½, Gas Light ordinary 68½, 69, 69¼, ditto preference 71, Imperial Continental 79⅝, 80, 80¼, ditto debenture 63, Monte Video 8¼, Primitiva 37s., 37s. 6d., South Metropolitan debenture 55¾, 56. On Wednesday, Brentford "B" 77¾, 78, Gas Light ordinary 69½, 69¾, ditto preference 72, Imperial Continental 79½, 79¾, ditto debenture 63½, Primitiva 37s., 37s. 6d., 37s. 9d., 38s., ditto preference 60s., Wimbledon 89½, 90. On Thursday, Bombay 5⅛, Cape Town 3, Gas Light ordinary 70, Imperial Continental 79½, 80, Primitiva 40s., 42s. 6d., ditto preference 59s. 4½d., 62s. 6d., 63s. 9d., South Suburban 74¼. On Friday, Brighton and Hove original 150, Gas Light ordinary 69, 70, ditto debenture 56, 56¼, 56½, Imperial Continental 80½, Primitiva 40s. 42s. 6d., 43s. 9d., 45s., ditto preference 62s. 6d., 63s. 9d., 65s., 66s. 3d., South Metropolitan debenture 55⅝, 56, 56¼.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex. Dividend.	Previous Div. or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref. .	..	57—62	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	52½
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5⅛	5⅛
50,000	10	Feb. 26	16	15/-	Bourne-mouth Gas and Water { 10 p.c.	29—30	24—26	..
383,110	10	"	7	7/-	B 7 p.c.	15—15½	10⅜—11¼	..
115,000	10	"	6	6/-	Pref. 6 p.c.	13½—14	9¼—9⅜	..
159,740	—	—	—	4%	4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid. .	261—266	79—83	79⅜—80
784,920	"	"	11	4¼%	Do. B New . .	204—209	77—80	77⅜—78
55,000	"	"	5	5%	Do. 5 p.c. Pref. .	109—111	81—86	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb. .	91—93	65—67	..
217,380	"	Feb. 26	11	10%	Brighton & Hove Orig. .	208—213	150—155	150
244,200	"	"	8	7%	Do. A Ord. Stk.	154—159	102—107	104
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33¼—33½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk..	88—90	66—68	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	"	—	—	Cape Town & Dis., Ltd.	1½—2½	2⅜—3¼	3
100,000	10	—	—	4½%	Do. 4½ p.c. Pref. . .	4—6	6½—7⅞	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	78—79*	..
1,513,280	"	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk. .	106—108	72—74	72—72½
560,000	"	"	5⅛	46/8	Do. 3½ p.c. do. .	103—105	66—68	..
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c..	..	170—180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk. . . .	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd. . . .	17½—18	11—12	..
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord. . .	98—102	68—70	68—70
2,600,000	"	"	3½	3⅜%	3½ p.c. max. .	76—79	54—56	..
4,062,235	"	"	4	4%	4 p.c. Con. Pref.	96—99	70—72	71—72
4,674,850	"	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	55—67	56—56⅜
130,000	"	"	10	10%	10 p.c. Bonds .	..	..	..
258,740	"	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16¼—16½	7½—8½	..
86,600	—	—	—	9⅛%	Hornsey 7 p.c.. . . .	..	120—130	..
131,000	Stk.	Mar. 12	7⅞	7⅛%	Ilford A and C. . . .	151—154	95—100	..
65,780	"	"	6⅜	5⅝%	Do. B	115—118	75—80	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb. . . .	92—94	65—68	..
4,940,000	"	May 14	9	4½%	Imperial Continental .	150—160	79—84	79½—80½
1,235,000	"	Feb. 12	3½	3⅜%	Do. 3½ p.c. Deb. Red.	84—86	62—65	63—63½
235,242	"	Mar. 12	6½	6⅛%	Lea Bridge Ord. 5 p.c. .	119—121	85—90	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	82½—83½	..
					{ B	146—148		
306,083	"	June 26	4	4%	Do, 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅝	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11½—12	8—8½	8½
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	"	June 26	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7⅞	North Middlesex 7 p.c. .	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7½—7⅝	2—3	..
50,000	50	Feb. 26	13	12%	Portsea, Island B . .	128—131	92—97	..
100,000	50	"	12	11%	Do. C . .	118—121	85—90	..
52,000	50	"	10	9%	Do. D . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅛—6	2⅛—2⅜	36/-—45/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref. .	4⅜—5	3⅛—3⅜	57/6—66/3
521,600	100	June 2	4	4%	Do. 4 p.c. Deb. .	91—93	78—80	..
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb. .	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref..	10½—11	7⅜—8¼	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb. .	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	"	"	10	10%	Do. B	222—224	180—184	..
523,500	"	"	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African. . . .	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord. .	111—113	73—75	..
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb. .	72½—74½	55—57	55⅞—56¾
224,820	"	Feb. 26	8½	7⅞%	South Shields Con. Stk.	157—159	140—142	..
952,795	"	"	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	74½
60,000	"	"	5	5%	Do. 5 p.c. Pref. . .	110—112	75—77	75½—76
135,000	—	—	—	4⅝%	Do. West Kent . .	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	"	May 14	5	5%	Southampton Ord. . .	99—102	76—78	..
120,000	"	Feb. 12	7½	5%	Tottenham District { A 5 p.c. .	135—138	95—100	..
782,275	"	"	6	3⅛%	{ B 3½ p.c. .	115—117	68—73	..
181,255	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
286,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅜	80/-	Wandsworth A 5 p.c..	151—156	114—119	..
255,636	"	"	6⅔	65/-	Do. B 3½ p.c. .	129—134	99—101	..
108,075	"	"	5/17/3	56/-	Do. C 3½ p.c. .	110—115	86—91	..
352,000	"	"	6⅓	58/9	Wimbledon 5 p.c. . .	117—122	88—93	89½—90
98,000	"	"	6⅔	65/-	Epsom 5 p.c. . . .	121—126	96—101	..
88 416	"	June 26	3	3%	3 p.c. Deb. Stk. . .	66—69	50—53	..

* Ex. Div.

Manchester Gas-Workers' Arbitration.—The award has been issued of the Committee on Production who sat in London recently in connection with arbitration proceedings relative to the advisability or otherwise of establishing a uniform working week in the Manchester Gas Department. An application was made by the National Union of General Workers on behalf of their members for a uniform working week in lieu of the present arrangement, whereby different sections of men work 52, 53, 54½, and 61½ hours respectively. No settlement had been arrived at between the parties; and the matter was referred to the Committee on Production for decision. The Committee have given careful consideration to the statements; and their finding is that the claim by the Union has not been established.

Increased Wages Demand by Miners.—The Coal Controller has arranged to meet to-day the Executive of the Miners' Federation of Great Britain, to consider the application agreed to by the Glasgow conference in July for a 25 p.ct. increase in the wages of all the men and boys employed in and about the coal mines of Great Britain. The application is based upon the increase in the cost of living, and not upon the economic position of the trade or the selling price of coal. The present wages in the different mining districts range from 7s. 6d. to 11s. 6d. per day, according to the class of work, with generally much higher average earnings by coal-hewers who work on contract at tonnage rate. It is said that, on a conservative estimate, the concession of the full demand would represent an addition to the wages bill of British collieries of £500,000 a week.

Mr. A. J. Ashton, K.C., sat at the Municipal Offices, Brighouse, last week, as Arbitrator in the matter of the wages of Corporation employees in all departments; the number of men affected being 150. The men had demanded an increase of pay, bringing their remuneration to a 12s. per week advance on pre-war rates; while the Corporation offered a 10s. advance. The Beverley Town Council have accepted a recommendation by the Gas Committee that an increase of 2s. in the war bonus to all classes of workmen in the Gas Department be granted, in response to an application by the men.

The Liverpool Gas Company have declared an interim half-yearly dividend of 2½ p.ct.

The Order in Council exempting trinitrotoluol from certain provisions of the Explosive Act, 1875, has been revoked.

The employees of Messrs. J. & W. B. Smith, Ltd., of Farringdon Road, have been granted a further war bonus of 3s. per week.

Stewarts and Lloyds, Ltd., interim half-yearly dividend on their preferred ordinary shares is announced at rate of 10 p.ct. per annum, payable on the 31st inst.

The Taunton Gas Company attributes a decrease of 5 million c.ft. in gas consumption during the past year to the lighting restrictions and the Summer Time Act.

At a meeting of the Greenock Gas Committee, it was intimated that the surplus for the undertaking in the past financial year was £5000, against an estimated amount of £1300.

Mr. W. H. Ellis, a Director of Messrs. John Brown & Co., Ltd., was last Tuesday elected Master Cutler of Sheffield for the fourth year in succession. He is the first master to hold office for that period.

It has been reported to the Oldham Gas Committee that an experiment with a gas-driven Ford car has been very satisfactory. The cost of running worked out at from 3 to 4 miles for 1d. One member remarked that, for an equivalent cost, they could get four times as much use as with petrol.

At the half-yearly meeting of the Normanton Gas Company last Saturday week, it was reported that the profits for the half year to June 30 amounted to £1567; the amount available for dividend being £4198. A dividend was declared at 6 p.ct. on the original stock, and 4½ p.ct. on the additional stock.

A suggestion has been made by Mr. C. Markham, of Chesterfield, for the erection after the war of a large power station adjacent to the South Yorkshire coalfield. The scheme is outlined in connection with a proposal to form a Joint Board for sewage, water, gas, and electricity for Sheffield, Rotherham, and Chesterfield.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Lady for Charge of Show-Room. No. 6342.
Deputy Engineer and Manager Ormskirk Gas and Electricity Company. Application by Aug. 31.
Chemist. No. 6336.
Chemist-Engineer. No. 6338.
Mechanic. Kettering Gas-Works.
Works Foreman. Newport (Salop) Gas Company. Applications by Sept. 1.

Appointments, &c., Vacant (*continued*)—

Clerk and Weighing-Machine Attendant. Aldershot Gas, &c., Company.
Gas Fitter. Halesworth Gas Company.
Skilled Labourer. Chiltern Hills Spring Water Company, Aylesbury.
Stokers. Carnforth Gas Company.
Stokers. Ormskirk Gas and Electricity Company.
Stokers and Firemen, Watford Gas-Works.

Appointments Wanted.

Gas-Fitter. No. 6341.
Accountant, Cashier, or Secretary. No. 6343.
Working Gas Manager. No. 6340.

Plant Required.

Suction Gas Producer Plants. No. 6339.

Tank Wagons for Hire.—No. 6333.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

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See illustrated Advertisement Feb. 20, p. III. of Centre.

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GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

Leaders Want a Lead.

ACCORDING to "Punch's" cartoon last week, the Kaiser, after reading the reminiscences of Mr. James W. Gerard, late United States Ambassador in Berlin, is represented as saying, "I never saw such an abominable tissue of de-"liberate truths." That is very much the position of the recognized leaders of the gas industry, who are not leading in the matter of the revision of gas finance and dividends. They admit the "tissue of deliberate truths" that compose the case for revision; but they plead a *cul de sac* and a *non possumus* condition. They cannot get farther. Someone is wanted who is not a recognized leader to give them a lead. As "Oikonomia" said in our "Correspondence" columns last week: "If the South does not move, the North will." Something must be done, for the position is going from bad to worse; and the gas industry of all industries is the only one that is working under such deplorably strange conditions. It may be and is true, as Mr. Charles Hunt said in his letter last week, that there are still sliding-scale companies that are paying their standard dividends. How long they are going to do so is another question. But whoever, when fixing the low standard dividends, thought that they would be subject to a 5s. income-tax, and such menaces as now exist! It is equally true that there is gas capital to the tune of several millions that is not receiving its standard dividend, and the dividend that it does receive is further curtailed by the heavy income-tax; and the fact is doing no good to the future financial interests of the industry. It is these sliding-scale and maximum priced companies who, through their own legislative and other conditions, need from Parliament relief from the financial consequences of the weight of unpremeditated influences—the concession granted to them being such that others can come in as their conditions send them flying farther along the dismal road the end of which no one can assert is in sight.

In a recent article, it was pointed out that gas proprietors are becoming restless over the continual shrinkage of their dividends. More business and smaller profits, owing to the heavier expenses, which promise to become still heavier, suggest to the practical mind of the outside man of business that there is something wrong. Something is wrong in two directions. It is in the first place clear that, in view of the low and unfair gas-trading dividends that are being paid in these times of heavy taxation and reduced purchasing power of money, gas and the other commodities of the industry are practically everywhere being sold at below what, at the present outlay for materials and labour, with other costs, is a fair commercial price. The gas man who has been accustomed to purveying gas at 2s. or 2s. 6d. need not to-day stand aghast at the thought of 1s. to 1s. 6d. increases. All the old conditions have been so overwhelmed by the new that penny and twopenny changes in price have been definitely abandoned as being altogether out of keeping with modern requirements. These are topsy-turvy times, and must be dealt with as such. The second direction in which something is wrong is in the gas industry being legislatively tied to a return upon its capital which was defined under conditions that have completely disappeared, largely owing to the weight and force of those which have come into existence through the war. In other words, the gas industry is to-day suffering very seriously from its own commendable pre-war virtue, which other industries—fortunately for themselves in these times—took good care not to emulate.

The voice of discontent and an appeal for action were again heard at the meeting of the Wandsworth, Wimbledon, and Epsom Gas Company on Tuesday last; and the speeches of Mr. W. Allard (who, we believe, is a Director of the Kingston-on-Thames Gas Company), and of Mr. J. E. Allen, together with the fact that Mr. H. E. Jones, the President of the National Gas Council, was in the chair, imparted to the meeting a character and an interest quite out of the ordinary. The Company is one whose pre-war conditions equipped it better than any other southern gas company for meeting the war-created *débâcle;* and the dividends that are being paid for last half year are good as things go, though, of course, of relatively greatly diminished value considering the weight of the income-tax and the lightness of the purchasing power. But when the speech of the Chairman is read, it will be seen that he admits the necessity of a further rise in the price of gas this half year, owing to the facts that, despite a large increase of business, the undivided balance, and an appropriation from the reserve fund, have been required to pay the dividend declared, and there are known additional expenditures for the current half year that will make thousands of pounds difference to the outgoings. And has the peak of war expenditure yet been reached? The railway men are asking for an addition of £1 per week to their wages; the miners are demanding a 25 p.ct. advance on current remuneration. He would be a bold man who said positively that the gas industry has seen the worst; and the position to-day is very bad. Yet Mr. Hunt said in his letter last week, "Have we yet the materials on which to base an "application?"—that is, for a revision of the sliding-scale. We reply with the questions: Have we the materials yet that are making investors in the gas industry discontented? Have we knowledge yet of the "materials" that have caused the market values of gas shares and stocks to descend to where they are to-day? Have we the materials yet that are causing the financial reputation of the gas industry to decline? When are we going to have the materials, if we have not got them now? And if we have not got them now, we shall not have them after the war. But Mr. Jones, the President of the National Gas Council, asks the shareholder critic to tell him what he would suggest they should do in the way of trying to produce some alleviation of the situation. He admits there is no exaggeration in the presentment of the current position; the facts are there, too large and too tightly established to have their existence denied. "But what can we do?" in effect asks the President. "It "is all very well to criticize, but what would you suggest "should be done?" Now let us put to him the inquiry as to whether the wells of initiation among the leaders of the gas industry are so dried up that those in and about London should themselves require guidance, and should so consistently plead a *cul de sac* and a *non possumus* condition?

What have the National Gas Council done in the matter? Have they seriously and resolutely taken it in hand, as a National Council, not as a Metropolitan one? Has a strong deputation representative of the whole private enterprise in the gas-supply industry been to the Board of Trade or Parliament through a deputation to members? Has the whole position been fully put forward in the right quarters? Mr. Jones, from the information that he possessed as President of the National Gas Council, stated at the Wandsworth meeting that "one member" of the Council had been to see the Board of Trade about the matter. One member! That does not strike us—however eminent the member—as being a thorough or very effective mode of handling a question of such supreme gravity to the gas industry. The member was told that it would be necessary to examine into the conditions of every gas company before making a change, and, therefore, the question would have to be deferred until after the

war. The pressure of work in the department is urged. We are not convinced as to the validity of the excuse. Special committees have been appointed, special departments have already been formed, and special means have been devised and adopted with the view of dealing with extraordinary circumstances arising from the war. Would it be such a terribly difficult thing, under the extraordinary conditions of the gas industry, for Parliament to permit it, subject to conditions, to suspend the operation of the sliding-scale, at an agreed point in respect of dividend, for the period of the war and a time after, until that point is again passed through the easing of conditions in regard to price? Meantime, the matter of permanent revision could also be set in train, instead of leaving the preliminaries until after the war, when, as Mr. Allard says, there will be a congestion of work to be overtaken, and when the position of the industry for receiving attention may be worse than now. The danger of delay is greater than that of perseverance. There is another matter bearing upon the request of the President of the National Gas Council for suggestions. Has he not seen, and have the Council not deliberated over, any ideas that have emanated from the North? If so, what is the result of the consideration? And have the Council put these alternatives before the Board of Trade, with a detailed statement of the grounds on which the request is made for relief that will save the capital of the industry from further depreciation? If not, why not? The matter must be seriously taken in hand. We can hardly think that any Government Department, when it finds an essential industry suffering from unmerited oppression, will not stir a hand or lift a finger or set brains to work, in order to see whether something ameliorating cannot be done.

A point that Mr. Jones made we freely admit. It is that it has been pleaded time and again that, on the faith of the sliding-scale, investors have embarked capital in the gas industry, and that therefore the standard price ought not to be "reduced." It follows, from this contention, as expressed by Mr. Jones, that, if there is an upheaval which entirely destroys the basis of the sliding-scale, there should be revision so as to ensure that the value of the capital is not unduly depreciated, and that it maintains a fair earning power. If investors thought there was no protection in this way, they would in the future carefully give the gas industry the go-by when looking round for a source of investment.

Preparing for Industrial Research.

In another part of the "Journal" is given (together with some extracts of special interest to our readers) a summary of the second annual report of the Committee of the Privy Council for Scientific and Industrial Research; and there is in it a great deal of interest to the men of an industry the expansion and progress of which are wholly dependent upon the revelations of research. The gas industry got as far as it could by empirical methods; but it came to a stage when all its empirical gropings would not carry it any farther, and, had it not recognized this, the chances are that there would have been regression from sheer inability to present a front in conformity with the higher standards which progress in other directions had set. However, the men of an industry that has been rescued by research, and that holds within it so much promise for the future by the aid of scientific exploration, must follow with interest the developments and the doings of a Department founded under the wing of the Government, and financed by it, the functions of which are exclusively devoted to the development and co-ordination of research in manner which shall prove of the utmost advantage to the country, and, therefore, to its industries and people. At the head and front of the aims of the Department is the establishment of research on a permanent basis; and a study of the present report promotes conviction that the Department and its Advisory Council are going about the work in the practical manner which will ensure the attainment of the objective. The report also indicates that there is no intention of wasting the funds that have been placed at the disposal of the Department, but that care will be exercised in the expenditure, so that nationally we shall secure the best return for the outlay. This is what would be expected from a mere glance at the names of the men who are actively associated with this work, and who are mostly men whose scientific attainments are well balanced by their knowledge of industrial and commercial affairs. That is as things should be. The man who lives in the higher realms of science, and has no association with applied science, is not much good for such work as this.

The direction in which the Department hopes to accomplish the larger part of its work is through the establishment of "Trade Research Associations," to which organizations grants will be made. The technical organizations of the gas industry should scrutinize very carefully the scheme of such associations, about which copious information is given in the appendices to the report. Where co-operation between manufacturing firms is not possible, where problems are complex, or where they immediately concern the consumer rather than the producer, there will be altogether different treatment. Fuel is an excellent illustration of this. Hence the establishment of the Fuel Research Board, under the directorship of Sir George Beilby, F.R.S., whose services are being rendered to the country quite gratuitously, as are those likewise of his fellow-members of the Research Board. But such work as is being done by the Board, it is not intended shall relieve from voluntary financial and other assistance the industries that benefit from the work, though naturally a large part of the expense should come from national funds, seeing that, as the Advisory Council truly remark, every home is interested in fuel economy, and so should contribute through the taxes to the cost of research. Such a research cannot be taken up by a single industry; for fuel use penetrates everywhere and under a great variety of circumstances, some of which are interlinked and interactive, though the industries concerned may be disunited. As one example, the gas industry stands at the very opening of work in the economic handling and treatment of coal; and from it should be drawn the fuel—solid and gaseous—for steam-raising and for many industrial heating processes. Proper investigation, however, should be made of the most economical methods of utilizing the fuels that the gas industry supplies; and those industries that use these fuels, as well as the industry that supplies them, should undoubtedly do a material part in aiding the work of the Board. This is expected; for we read that the Board "hope to receive "assistance, if not contributions, from some of the indus- "tries more immediately concerned." Incidentally, it may be remarked, the expectation also applies to illuminating engineering.

Although the Fuel Research Board have not up to the present time got beyond the preliminary work of thinking-out and mapping-out their course of action, sufficient is seen to show that it will be of far-reaching importance, and have distinct and far-reaching effects. The Advisory Council, it is clear, intends the whole Department to be the servant of the nation; and one way in which this ambition can best be achieved is to act as counsellors where scientific guidance is required by Government Departments. Many problems come before such Departments which they are not qualified to scientifically handle—such as the one referring to the composition of town gas, having regard to the requirements of the day, which are not—though Government Departments have thought they are—bound up solely with calorific value. They claim regard for flame temperature, which has relation (among other factors) to the constitution of the gas. This matter the Board of Fuel Research have in hand. As they proceed with their survey in this and other directions, it is patent that at every turn fresh openings will be found for their energies, the application of their knowledge, and the employment of a large retinue of scientific workers, who will not be allowed to follow precedents in relation to a masterly bureaucratic inactivity.

Mention is made in the report of work along other lines —such as domestic heating and atmospheric pollution; and in this connection there is a passage which signifies much to the gas industry. "The collection and tabulation of "careful records as to atmospheric pollution in different "parts of the country should be extended after the war; "and the statistics should supply in the future one of the "means of gauging the work done by the Fuel Research "Board in promoting methods of smokeless combustion." The degree of the assistance rendered to the gas industry in putting into their mains a fuel gas on as economical terms as possible, and the simultaneous inducement to the public and industries to use coke, will greatly contribute to this method of assessing the value of the work of the Board, and will add to the indebtedness of the industry to them. The help that has so far been rendered to the gas industry by the Advisory Council in connection with the research into refractory materials is much appreciated, as will be the encouraging reference to the subject in the report.

The Low-Temperature and Tar Production Muddle.

IT may now be said with a fair amount of confidence that the gas profession will hear little (if anything) more of the request for carbonization at low temperatures, unless it be in the shape of reproach for the want of sagacity in circulating a plan not only suicidal to gas undertakings, but one that, through the curtailment of carbonizing power, would have had a reducing instead of a supplementing effect upon the production of the required creosote oils. From more than one source, the Department from which emanated, as a tentative proposal, the idea of lowering carbonizing temperatures have received information which has (as in our issues for Aug. 21 and 28 it was intimated would be the case) conclusively proved to them that their plan would, in the resulting bulk of fuel oils, have fallen far short of its anticipated productive glory, and that the extra yield of fuel oils per ton of coal carbonized would have been, when the cost of the losses had been paid, a ruinous procedure. The experiment at some gas-works was carried just far enough to give a salutary satisfaction as to the overall inefficacy and expensiveness of the low-temperature project. To-day, in our "Correspondence" columns Mr. J. E. Blundell, of Macclesfield (this is only one among similar suggestions that have reached us), inquires whether "it is not due to the gas profession that they should now be informed of the reasons why "such a drastic proposal was put forward without proper "consideration?" Perhaps, however, it would be kinder not to press the matter. It is obvious that, as we said only last week, someone has blundered; and the fact will have a healthy effect on future recommendations, which will doubtless be more critically examined from all points before being fathered.

The question referred to is not the only point in Mr. Blundell's communication. He shows what would have happened in his case had he reduced his make to 9000 c.ft. per ton as compared with his present procedure, using vertical retorts, and steaming at the rear end of the charge. No low-temperature process working at the 9000 c.ft. stage could have beaten his production of tar per ton of coal carbonized; and what would have happened to it in total volume is conveyed by the figures that he presents. The figures also tell a tale of the disastrous consequences that would have befallen the gas supply of Macclesfield, including the probability of the undertaking, without a large amount of State support, being hurled headlong into a condition of insolvency. We need not specifically quote the figures he gives. They are so remarkable that their close acquaintance is sure to be sought by our readers. There is only one comment that need be made; and it is that our correspondent (through adopting Prof. Lewes's figures as a standard as to probabilities, which figures were obtained from plant specially constructed for low-temperature working) has been, if anything, modest in his estimates as to effects upon his make—that is to say, judging from Mr. John West's temperatures, throughputs, and results as given in the "JOURNAL" last week. With Prof. Lewes's temperature for 9000 c.ft. of gas per ton, it would probably require, according to Mr. West's results, about three times the plant to equal what Mr. Blundell is now doing. However that may be, on Prof. Lewes's estimates, Mr. Blundell shows that he would require double the plant he possesses to meet, at the temperature named, the maximum winter make. This supports the contention Mr. West submitted last week that the coal-gas plant is not in existence to enable, in present circumstances, the application of low temperatures to gas making.

The Outlook for Oil.

In the past the oil market has been wont to move in a mysterious way; and those who have anything to do with oil are resolved that it shall keep up its character in this respect. In our issue for Aug. 14 [p. 263], there was a quotation from the "Year Book" of the United States Bureau of Mines in which it was asserted that the estimated supplies of oil in the United States are sufficient to meet present needs for only 25 to 30 years. This estimate, it was said, "not only includes the oilfields already known and developed, but makes liberal allowances for undiscovered fields in prospective oil territories." It was also stated that, notwithstanding the incessant drilling that has been proceeding "the production to-day is little, if any, more than the production of 1915, nor have any large new fields producing petroleum been developed." These statements as to the position of the oil industry are fully supported in a manifesto issued by Mr. A. C Bedford, the President of the Standard Oil Company, and Chairman of the Committee on Petroleum of the Advisory Commission of the U.S. Council of National Defence. He shows that absorption of oil is greatly in excess of production—the development of the automobile being largely responsible, together with the increased demand for oil products. Returns from new drillings are not, he declares, as satisfactory as a year ago. He appeals for economy on the part of users and for continuous effort on that of producers, despite the discouragement of results and present heavy costs for drilling and developing. The "Petroleum Review" recently appealed for the greatest conservation in consumption; but it now urges that the better way to avert a crisis is to secure a larger supply, which goes without saying. There are, it tells us, territories not less prolific than the old awaiting well-directed drills; and it is asserted that Governments are holding richly oil-saturated lands which only require development, if opened up. The United States Government is one of these; but it is intimated that an agreement has been reached with it which is expected to result in the opening of millions of acres of rich oil land in California and Wyoming. It is considered that this action will put an end to the danger of paralysis of business over the whole of the western section of the country. Did the Bureau of Mines know anything of this development, or of the existence of the territories, when stating that their computations made liberal allowances for prospective oil territories? We should imagine they did; for it would be part of their business to be cognizant of what the Government were hoarding-up in this way.

The Miners' Open Mouth.

The Coal Controller and the Government are faced by an unpleasant demand, and large coal consumers are awaiting the issue with a considerable amount of uneasiness. The Miners' Federation of Great Britain have presented a request for a 25 p.ct. advance on the current wages of all men and boys employed in and about the collieries. A rough calculation puts the increase per head at 10s. per week; and with a million men engaged in the industry, this means £500,000 a week. The "Iron and Coal Trades Review" estimates that such an advance would mean 2s. per ton on the cost of production throughout the country; and it thinks that, if this is allowed, the Coal Controller could hardly resist an application for an increase of the 4s. excess over pre-war prices allowed by the Price of Coal Limitation Act. Many gas coal contracts are settled subject to any increase in the excess price being taken into account; so that for these, as well as for future war time contracts and purchases, the concession of 25 p.c., which is unthinkable in view of the wages now being earned by the miners, would mean a heavy load for large consumers. The gas industry is pretty well crippled now by the price that coal costs delivered on to the works; and the fresh demand of the miners is not regarded with anything approaching equanimity.

Analysis of Small Quantities of Light Oil.—In a paper contributed to the American Gas Institute by the Laboratories of the H. Koppers Company, Messrs. F. W. Sperr, jun., and A. Allison Kohr remark that chemists engaged on benzol recovery processes have for some time been interested in devising methods for the estimation of the principal constituents of the various light oils derived from coal tar or coke-oven gas. The authors have tested some of the numerous methods suggested during the past two years, and have found them to give satisfactory results, though they suffer from the disadvantage of being applicable only when large samples of the light oil are available. Their own regular method for the determination of light oil in coke-oven gas, which they expect to publish in a future paper, produces 20 to 50 c.c. of light oil, in a single determination. The method discussed in the paper was devised for the purpose of estimating the amounts of benzene, toluene, and solvent naphtha that such light oil could be expected to produce; the idea being to combine the light oil produced from two or three tests of coke-oven gas for each determination. The method has been employed for some time, and has given good results for the usual run of light oil samples, which generally contain at least 50 p.ct. benzene, and not over 30 p.ct. toluene. The accuracy is much less for light oil, containing less benzene or more toluene; but such material is not so often encountered. Such check determinations as the authors have made on samples of known composition, show that, with careful attention to details, the amounts of benzene, toluene, and solvent naphtha can be determined, with an error in each case amounting to about 1 p.ct. of the total light oil, which is satisfactory enough for ordinary purposes.

EXPLOSION AT THE GRIMESTHORPE WORKS OF THE SHEFFIELD GAS COMPANY.

Shortly after 6 p.m. on Monday of last week, a serious explosion occurred at the Grimesthorpe works of the Sheffield Gas Company, causing considerable damage to a station meter-house, the roofs of the exhauster-house, the iron store and blacksmiths' shop, and one or more lifts of a telescopic holder. The effects of the explosion were felt for fully a quarter-of-a mile; and in this radius houses of substantial construction were shaken, windows smashed, and slates from roofs loosened and shattered as they fell into the street. The flames shot up a couple of hundred feet in height; and after a few seconds the neighbourhood of the gas-works was overhung by a dense pall of smoke.

The meter-house contains two 250,000 c.ft. per hour station-meters; and the drum of one of these was under repair. The inlet and outlet of the meter are provided with hydraulic water-valves with seals 18 in. deep; and, as far as can be ascertained, owing to a temporary blockage, or sudden rush of gas, the seal was blown out of the inlet-valve, causing a large volume of gas to immediately fill the meter-house. From some unexplained cause, this ignited, blowing the front out of the building, and the roof off.

The recoil, after the explosion, ripped the sides out of an adjoining holder, 150 ft. in diameter, which is situate 40 ft. from the meter-house. The holder at the time was quite full of gas, and contained $1\frac{3}{4}$ million c.ft. This holder is of the four-lift type—the upper lift rising above the standards. The first and second lifts are still workable; and the fourth is believed to be undamaged. The third lift is the one that suffered most from the explosion; all the No. 11 gauge intermediate plates (between cup and grip and two rings of strong plates) being torn away, leaving a hole 102 ft. long by 19 ft. deep. This allowed some 800,000 c.ft. of gas to rush out; and the gas igniting made a huge flame, which extended 100 ft. in all directions, burning some sixteen men who were working in the vicinity. These men were sent to the Royal Infirmary, and nine of them are still detained in the institution; two of them, named Mottershaw and Towns, being in a somewhat serious condition.

The gas-works are situate in the centre of a number of large works; and the highly efficient ambulance resources of these were quickly in operation, with a success that called forth the warmest praise of the doctors who hurried to the scene. It may be mentioned that very valuable aid was rendered by the ambulances from Messrs. Vickers, Ltd., Cammell, Laird, & Co., Ltd., and W. Cook & Co., Ltd. The city fire brigade was also quickly in attendance, with three motor fire engines, and promptly dealt with the buildings that were on fire.

Gas-making had to be suspended until all traces of the fire were put out, and the plant examined to see the extent of the damage. Manufacturing operations were, however, resumed at 11 p.m.

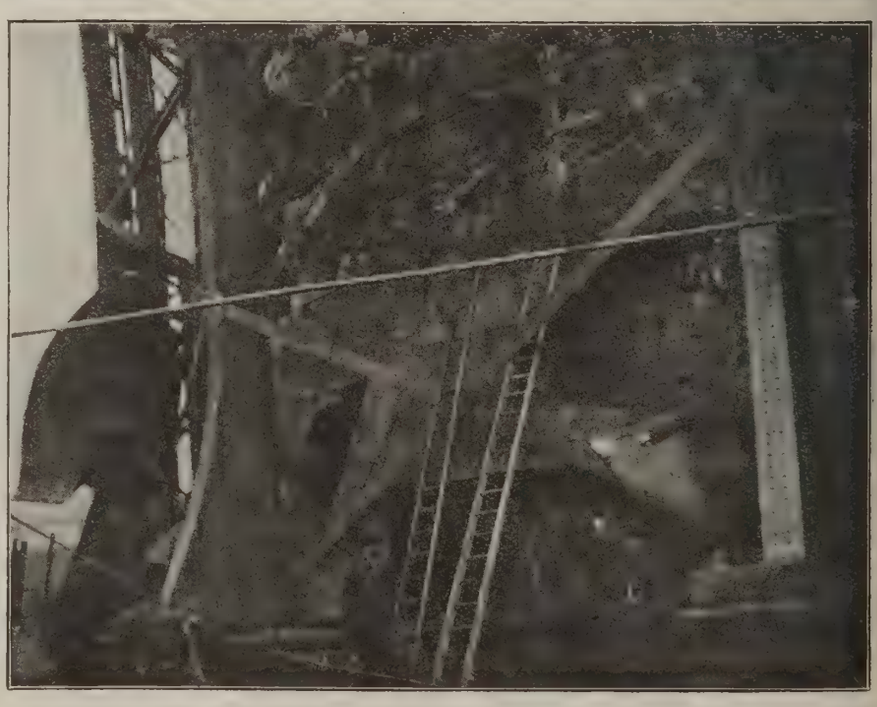
Mr. E. J. Wellens, the Superintendent of the works, sustained a slight injury to his leg, by stumbling over some *débris* after the explosion.

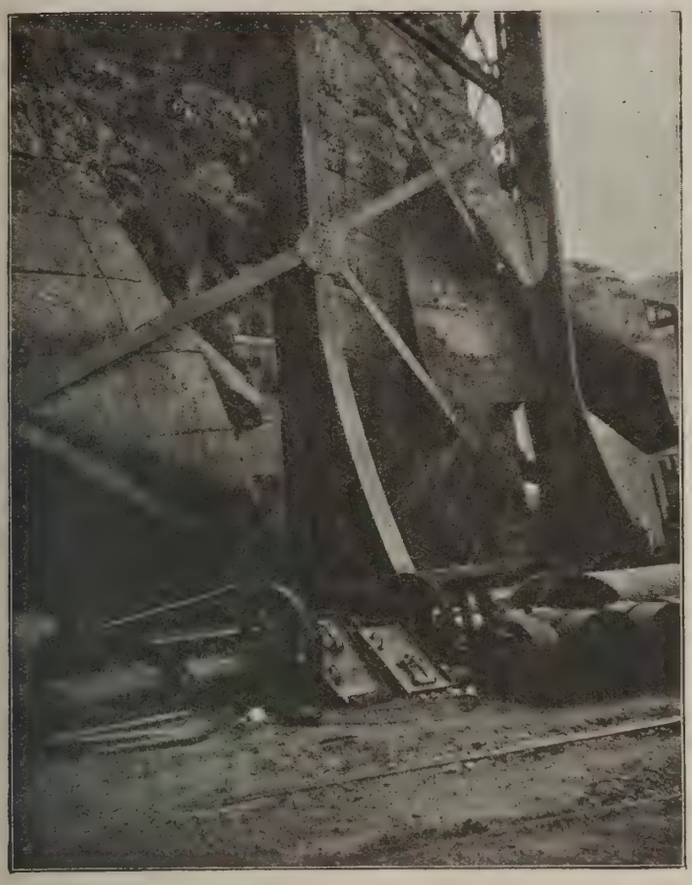
Referring to the accident, a local paper said:

Happily the noise of the explosion and the sight of the great tongues of flame enveloping the huge gasholders were more terrifying than the actual extent of the damage warranted. Not more than a couple of dozen cases of serious injury necessitated treatment, though many minor cases received first-aid attention. Though about 500 or 600 men are employed at the works, nearly all the day workers had left work half-an-hour earlier, and not more than about 60 remained in the works when the explosion occurred.

From the meter-house, the fire spread to the roof of the adjoining engine-house, workshops, and joiners' shop; but the fire brigade, with the aid of volunteers, quickly mastered the outbreak, and confined the damage to the meter-house, and one of the holders. The escaping gas became ignited; but no further explosions beyond that in the meter-house resulted.

The wrecked plant presented a scene of desolation to the early arrivals. Among the first of these was Dr. Damms, whose surgery is only a few hundred yards distant. To a press representative, he





afterwards admitted his surprise that the extent of personal injury was so comparatively slight. Some of the sufferers presented a somewhat ghastly appearance, with blood flowing from scorched and begrimed features. A number of women are employed at the works, and one was struck in the face by a flying brick. A man rushed to the surgery with the skin burnt off his hands and arms. He had thrown his arms over his face and head, and to this precaution probably owed his escape from serious injury to the skull. Several other men were overcome by the fumes.

Registration of Directors' Names.

Reference was made a fortnight ago to the provision for the registration and publication of Directors' names under the Companies (Particulars as to Directors) Act, which received the Royal Assent at the beginning of the present month. This measure extends to directors of companies, or persons who occupy the position of directors, and any persons in accordance with whose directions or instructions the directors of a company are accustomed to act, the provisions of the Business Names Act relating to partners in firms. While, however, the Business Names Act, in its application to firms, extended only to those in which the firm-name did not contain the true surnames (without any addition other than the true christian names) of its partners, the present Act applies to all companies registered under the Companies Acts, as well as to companies incorporated abroad that have a place of business in this country. Many firms and individuals who desired to remain immune from the provisions of the Registration of Business Names Act found themselves able to do so by means of registration under the Companies Acts. In order to deprive as promptly as possible these modest persons (natural-born British subjects or otherwise) of any advantages they may have secured by this procedure, the special obligation to file the required particulars not later than Sept. 2 is cast upon companies registered between Nov. 22, 1916, and the date of the passing of the new Act. The measure is an important one; and the precise bearing of its four sections will need to be widely understood. To this end, Mr. Herbert W. Jordan has written an explanatory booklet. The price of it is 6d. net; the publishers being Messrs. Jordan & Sons, Ltd., of No. 116, Chancery Lane, W.C. 2.

Radiator Heating.—The economy and advantages of radiator heating are the subject of the September issue of the British Commercial Gas Association's "A Thousand-and-One Uses for Gas." There are discussed separately the three types of radiators in connection with which gas or coke is used—that is to say, those heated by hot water or steam circulating from a central source; those heated by steam locally generated by gas-burners underneath, and usually called "gas-steam radiators;" and those that are heated by gas-burners producing hot air within them, and generally known as "steamless" or hot-air gas-radiators. Hints are given on the subject of fitting-up; while on the point of the hygiene of radiator heating, there are some quotations from an article by Mr. H. James Yates, which appeared in the "JOURNAL" for Nov. 8, 1910. The great variety of positions for which radiators are suitable is remarked upon; and this is further emphasized by a series of photographs of actual installations.

PERSONAL.

Mr. T. H. BEAUMONT, the Manager to the Annfield Plain and District Gas Company, has been appointed Manager of the Stratford-on-Avon Corporation Gas-Works, in succession to the late Mr. G. S. Kendall.

Mr. R. BYRON, the Manager of the Nenagh (co. Tipperary) Gas-Works, who has been appointed Gas Manager at Peel (Isle of Man), is a grandson of the first Manager of the Nenagh works. Until now, the name of Byron has always been associated with gas in Nenagh.

Mr. W. NEWTON DREW, Managing Director of Messrs. Newton, Chambers, & Co., Ltd., whose paper on the "Rectification of Benzol," read before the Midland Institute of Mining, Civil, and Mechanical Engineers, was reported in the "JOURNAL" for March 13, has been granted a Commission in the Motor Transport Department, A.S.C.

The works employees of the British Gas Company at Hull have presented Mr. A. ALLAN, the Under Manager, with a gold watch chain, seal, and a matchbox, as a mark of their respect and esteem. Mr. Allan has retired after forty years' service with the Company, Mr. John Young (the Engineer and Manager) made the presentation; and Mr. Allan, in replying, recalled the many happy times he had spent with the staff.

Mr. D. T. MARWICK, who has been eleven years with the Glasgow Corporation Gas Department as Assistant Chemist, Chief Chemist, Superintendent, &c., was presented by his fellow employees with a handsome set of fish knives and forks, with a silver hairbrush for his wife, on leaving the service of the Corporation to take up the position of Assistant Engineer and Manager at the Greenock Corporation Gas-Works, under Mr. George Keillor.

The Military Cross has been awarded to Second-Lieutenant HILTON FURNISS, of the West Riding Regiment, for conspicuous gallantry and devotion to duty in leading his platoon with great dash and determination against very heavy hostile machine-gun and rifle fire. He was twice wounded, the second time severely in some fourteen places. But in spite of this, he continued to urge his men to hold their line until brought in at dusk by a stretcher-bearer. Before the war, Lieutenant Furniss was the Assistant, Manager at the Slaithwaite Gas-Works.

Mr. A. W. GREY, who for the last six years held the position of Chief Assistant to Mr. Frank Livesey, the Engineer and General Manager of the Maidstone Gas Company, has recently been appointed Engineer and Manager to the Seaford Gas Company. Mr. Grey, who is 35 years of age, was educated at Rutherford College Newcastle-on-Tyne. He served as an articled pupil to Messrs. John Abbot & Co., Engineers, of Gateshead-on-Tyne. On the completion of his articles, he was appointed Junior Assistant to Mr. A. B. Walker, of the Walker and Wallsend Union Gas Company. For the last thirteen years, Mr. Grey has been on the staff of the Maidstone Gas Company; and at the last meeting of the Directors a minute was passed as follows: "The Board wish to record their appreciation of his valuable services to this Company, especially as to the ability displayed by him in his outside work and in obtaining new business for the Company." He is a member of the Southern District Gas Association of Gas Engineers and Managers.

MR. MAURICE GRAHAM.

The Shipping Controller has requisitioned the Minister of Munitions for the services of Mr. Maurice Graham as Chief Construction Engineer of the Ports Branch of the Ministry of Shipping, in connection with the building extensions and mechanical equipment required at the ports.

Mr. Graham entered the Ministry of Munitions early in 1915 as a voluntary worker, and designed and erected the first gun ammunition storage and fusing factory at a Western port. Upon its completion, he was asked by Sir Eric Geddes to accept the post of Director of Construction and Equipment of the National Gun Ammunition Shell Filling Factories, which have played such an important part during the war. Each factory covers some hundreds of acres, and employs thousands of munition workers. The rapidity of erection, equipment, and organization of this huge undertaking (the structural expenditure on which runs into millions of pounds) was a feat of which Sir Eric Geddes was justly proud, and was accomplished within twelve months. Mr. Graham was then invited by Sir S. H. Lever, the Assistant Financial Secretary to the Ministry (afterwards Financial Secretary to the Treasury), to join the Finance Department, controlling constructional expenditure, loans, &c.

Having always been known for his high-speed engineering and constructional work (based on up-to-date ideas), we are not at all surprised to hear that Mr. Maurice Graham's services are in demand by the Government departments at the present time; and in his present sphere he will be quite at home.

Calorific Standard Orders.—The Board of Trade inform us, through Mr. Garnham Roper, that they have made Orders under the Gas (Standard of Calorific Power) Act in respect of the Radcliffe and Pilkington Gas Company, the Horley District Gas Company, and the Tunbridge Wells Gas Company.

CRUDE BENZOL, CRUDE NAPHTHA, AND LIGHT OILS ORDER.

THE Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations, and of all other powers enabling him, orders that—

1.—No person shall, as from Oct. 1, 1917, until further notice, supply to any person, or take or accept or attempt to obtain delivery of, any crude benzol, crude naphtha, or light oils containing recoverable quantities of benzol or toluol, except under and in accordance with the terms and conditions of a licence issued by or under the authority of the Minister of Munitions, or under and in accordance with the terms and conditions of a contract in writing for the delivery of such articles existing at the date of this Order.

2.—All persons engaged in producing, treating, distributing, storing, selling, or dealing in crude benzol, crude naphtha, or light oils, or in any manufacture, trade, or business in which the same or any of them are used, shall make all such returns with regard to their businesses as may from time to time be required by or under the authority of the Minister of Munitions.

3.—For all purposes of this Order the following expressions shall have the following meanings:

"Crude benzol" and "crude naphtha" shall mean crude benzol and crude naphtha obtained by the distillation of coal tar or extracted from coal gas, including benzolized wash-oil before separation of the crude benzol.

"Light oils" shall mean light oils obtained by the distillation of coal tar.

All applications in reference to this Order, including applications for licences, should be addressed to the Director of Raw Materials Supply, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1.

LIMITATION OF GAS SUPPLY IN GERMANY.

THE question of the limitation of the gas supply is still exercising the minds of the citizens of Berlin; and the correspondent who has hitherto favoured us in this matter forwards two further translations of articles which were published in the "Vossische Zeitung" of the 23rd ult. These will no doubt interest readers.

EXTRACT from the "VOSSISCHE ZEITUNG," of AUG. 23.

GAS LIMITATION.

The discussion which the representatives of the six towns forming Greater Berlin and of most of the Suburban Communes, as well as of others interested, had yesterday with the Commissioner for Electricity and Gas lasted several hours.

The Government Commissioner for Coal Distribution, who took part in the discussion, pointed out the necessity of some limitation, as the consumption of gas must be made to coincide with the quantity of coal at disposal. The representatives of the communes admitted the necessity of some limitation, but attacked the form and contents of the decree issued by the confidential officials.

The Chief Burgomaster of Berlin gave the reasons, at the request of the Communes of Greater Berlin, for the amendments which these had in common proposed.

Government Commissioner, Prof. W. Kübler, stated that he was prepared to take the suggestions into consideration. These were that, in the first place, the consumption must not in future be based upon the capacity of the meter.

Some limitation of the consumption can, however, scarcely be avoided. It is proposed that this limitation shall be 10 p.ct. As a basis, the consumption during a quarter, and not during a month, shall be fixed. In order to treat the small consumer with consideration as much as possible, an "existence-minimum" shall be allowed free. The prepayment meter shall not come under the decree. It was further emphasized that the efforts of the communes should be directed to preventing the confidential officials having power to lay down the most peremptory stipulations. The conditions must be fixed by the communes—in this case through the Union of Greater Berlin.

A Special Committee was formed this morning in order to formulate more exactly the demands respecting a percentage limitation and other special requirements.

Stress was also laid upon the fact that Greater Berlin needs a quicker and better coal supply. On Tuesday already a discussion had taken place in the Rathaus upon this question, at which a representative of the Government Commissioner for Coal Distribution as well as of the Chief Command took part.

The Chief Burgomaster informed a contemporary that all parties—including the Government Commissioner for Electricity and Gas—desired that the discussion should as speedily as possible be brought to a satisfactory conclusion. It was to be hoped the new stipulations, which will probably come into force at the end of August, will cause as little inconvenience to the consumers as possible.

CHARLOTTENBURG ON THE GAS AND HEATING QUESTIONS.

The Charlottenburg Town Council had yesterday before them a motion of urgency, in which the Court of Aldermen is invited to protest energetically against the basis which the officers appointed by the Commissioner for Gas and Electricity have fixed.

Before any discussion of the matter took place, the Chief Burgomaster acquainted the meeting with the results of yesterday's interview of the representatives of Greater Berlin with the Government Commissioner.

The notorious decree of the officials has evoked the justified astonishment of the various communal authorities. The consequence was that, finally, the authorities of Greater Berlin met and arranged for an interview with the Government officer, which took place yesterday.

The first question put to the Government official was whether the decree which so deeply affected the economic life of Berlin—that gas must be saved to the extent of 20 p.ct. of that used the previous year—must stand. The Government Commissioner, and also the representative of the Chancellor who was present, convinced the town representatives that economy must be effected. The reasons for the necessity could not be publicly discussed. The General Government decree that this year only 80 p.ct. of the previous year's consumption may be used will consequently, in all circumstances, stand.

The method proposed for Greater Berlin is not the right way to effect a saving of 20 p.ct. The critics of the measure, with justice, asserted that for the first time it is not the Communes themselves who have been entrusted with the carrying out of the decree, but officials who have no authority to represent the citizens. This point will in future be taken into consideration by the Government Department.

The Chief Burgomaster acquainted the meeting with the proposed amendments mentioned above. His statements were received with assent. A member expressed the thanks of the meeting for his energetic intervention. Another member doubted the possibility of carrying out a general reduction, without great danger to economic life. Another asserted that the gas ordnance was typical of the war enactments. A couple of men come together and decree something out of hand, without being at all clear as to the practicability of carrying it out. Then follow protests. Against this method of utter regardlessness towards the consumers, the most energetic protest must be made. For this reason, the action decided upon by the Councils of Greater Berlin will be welcomed. One can see by the decree that conditions are extraordinarily bad, because last year everybody was economical in the use of gas. The whole thing is a perfect muddle. It is inexplicable what will happen in the winter. There is not enough coal for heating, and the supply of hot water is consequently limited. Some supplementary arrangements must be made. Those who last year burnt little or no gas, and made as much use as possible of electricity, cannot take nothing from nothing—*ex nihil nihil fit*.

Failure is everywhere, because the organization is bad. We certainly have a Commissioner for Gas and Electricity; but he is not competent in matters relating to the coal supply. Then we have a Coal Commissioner; but he is not competent in the matter of the delivery of coal. And so it goes on. It is here where the axe must be applied.

It cannot be foreseen what will happen in winter if the towns do not receive more coal. The whole of our war industries will suffer immensely. It is the cry of the day that the State should break with the Coal Syndicate (which thoroughly well knows how to look after its own interests) and nationalize the whole coal trade.

The meeting accepted the motion, with the recommendation that the magistrates should also protect the interest of the citizens in the matter of the limitation of the hot-water supply.

ELECTRICITY SUPPLY MEMORANDA.

IF anticipation is right regarding the likelihood of the Board of Trade Electric Power Supply Committee being favourable to the formation of large centralized electricity generating-stations, privately capitalized, and to the supply from them in bulk to authorized distributors, it is obvious that the scheme of the Lancashire and Cheshire Electric Supply Committee (noticed last week) will come into conflict with the proposals. If so, the Board of Trade will hardly be able to look kindly upon the Lancashire and Cheshire project; and it will then probably come to naught. There are already signs of jealousy and mistrust between municipal and company representatives; and whatever is done with the intention of raising the economic status of the electricity industry, it is certain that there will not be unalloyed pleasure all round. It will be remembered [see last week's "Memoranda"] that the Lancashire and Cheshire Committee recommended the formation for these counties of a Joint Board possessing plenary powers, and working with District Boards appointed from itself. On the Joint Board there would be ninety members; but only eleven of these would be the representatives of four companies. Naturally, in such circumstances, the companies can see themselves completely swamped and impotent, and, looking to the character of the powers proposed to be conferred on the Board, they can see the companies delivered body and soul into the hands of the municipal dominating force. On the other hand, the scheme itself is a tacit declaration that the Lancashire and Cheshire municipal authorities have no wish (whatever the Departmental Committee may think) to be dominated, in the matter of generation, by large companies in which the municipalities could not, from the very nature of their financial powers and obligations, have any material part. Another aspect of the matter that does not appeal to the company component of the proposed Board is that it is contemplated that the Board shall have large advisory and vetoing authority over extensions of generating plant and so forth, as well as the power to erect new stations, and acquire existing or new ones. What does this mean if not that the integrity of the company concerns as complete organizations, and therefore as sources of investment, would be assailed, that administrative responsibility would be divided, and that over one part of the administration the investing shareholders would have no power

Mutual Fears.

of control? Of that, they would be wholly deprived. Under the circumstances, it is not astonishing that the representatives of the companies on the Committee were not prepared to sign proposals that relinquished any part of the rights, powers, and privileges of the concerns. Interlinking was a matter quite innocent of any parting with existing powers.

Discounting the Benefits of Unification.

Fears exist in another direction. It is suggested that many advantages would accrue if all the undertakings in the two counties were concentrated in one owning and operating authority. Much of the time at present involved, and much of the expense incurred, would be saved. To an extent this is true; but, at the same time, what has happened in the case of the Metropolitan Water Board might occur in connection with the octopus-like Electricity Board with power to own and operate over such a large territory as Lancashire and Cheshire. In such a case certain of the more favoured undertakings see the prospect of the position of their present areas being jeopardized. Their capital expenditure per kilowatt of plant installed is something perhaps on which they pride themselves; the cost per unit generated, and consequently the selling prices may be low. On the other hand, just the contrary conditions may exist in connection with other concerns; and the local conditions may be unfavourable. Thus, it is acknowledged by the Committee that centralization might, unless adequate safeguards are provided, adversely affect the best circumstanced undertakings, and, at their expense, improve the conditions of those in less affluent circumstances. Naturally, this would be so; but there has been a lot of preaching as to the advantages of concentration, as to load and diversity factors, and as to conferring benefits on the larger number. The advantage to the already well-endowed concerns, we understood, was to come from further generation economy; and to gain this they could surely afford to give up something. But there is the inevitable fly in the ointment. Centralization and consolidation are all very well, it is argued, so long as the position of an individual concern and that of its consumers are not being prejudiced. Elimination of the less efficient stations cannot alter local conditions or iron-out inequalities. If the good-conditioned concerns are to be dragged down by having piled upon them a number of worse conditioned undertakings, and so have the level of their own better conditions lowered, then there may be cause for wishing they had never committed themselves to the scheme—that is to say, if it materializes. There is a significant note in the report bearing upon this. The signatories make it quite clear that the contained recommendations and suggestions represent their own personal opinions, and not necessarily the views of their respective undertakings. They are wise to have done this; for there is no doubt the scheme will be dissected with very great care by those who are directly responsible for the administrative control of the undertakings. But here and there are detected signs that the Committee have attempted to stave-off opposition. For instance, they recommend that the acquiring of existing stations should only be exercised after the Joint Board have approved thereof by a majority, which would be subject to the sanction of the proper central Government tribunal. The company undertakings will find poor protection in this with their pigmy representation. A two-thirds part of ninety is sixty, and the companies' representation numbers, as we have said, only eleven—at least, that is as we understand the position.

Interference with Profit Making and Taking.

It is proposed that the Joint Board shall see that the distributing undertakings do not take undue advantage of the cheaper supply which it is hoped the Committee's plans will furnish. The Committee are sanguine as to the future. They find that the undertakings concerned generated no less than 421 million units during the year ending March 31, 1916. Under normal conditions, the rate of increase is said to be about 20 p.ct. per annum; so that it is thought fair to expect during the next five years an increase to 1000 million units. As "normal conditions" are mentioned, we suppose it may be taken that the calculation has been made on pre-war conditions. Under these conditions, and with large units of plant—say 10,000 to 15,000 KW.—concentrated in suitable localities, with high-tension transmission, and the utilization of sources of waste heat, it is considered that there would be a large reduction in annual costs, and supplies would be given to the distributors at cost price. Here the Committee stick their fingers into the municipal pie, and propose interference with local policy in a way which not a few councillors will severely resent. We do not say the Committee are not right—in fact, there is approval in the main. In the first place, the undertakings receiving current at cost price, the Committee are of opinion that it may be necessary to introduce safeguards to ensure that the advantages of the cheaper production arising out of a federation of interests are not neutralized by the distributing authorities charging unduly high prices to the consumers within their area. Further the Committee treat the administrators to a little sermonizing on the subject of the making of profits for aiding the rates. The antagonism of the "JOURNAL" to rate-aid is not a thing of yesterday; and in our editorial columns last week, the iniquity of drawing from the rates part of the current war costs of supplying electrical energy was commented upon. In setting forth a basis of charges for supplies, the Committee have not made provision for any "direct" profit on sales for the purpose of rate-aid, which must, therefore—in the absence of any legislation—be left to be decided by each undertaking, as at present, in accordance with the accepted local policy. The Committee cannot refrain, however, from giving expression to the opinion that the practice of making profits for the purpose of handing over substantial grants in aid of local rates is detrimental to the interests of an adequate and economical supply of electricity, particularly for industrial purposes. On the other hand, they lay stress on the necessity of making adequate provision for depreciation and obsolescence of plant. There are municipal administrators who will present a very straight back to the suggestions of interference with what they regard as their own prerogative in the matter of making rules as to procedure within the terms of their parliamentary powers.

Gas-Stoves and Electric Light Users.

The colliding influences that are at work in connection with the schemes that are in the making for improving the economic conditions of the electrical industry, do not present subject-matter for the most sprightly reading. Let us turn to another topic which may perhaps have a little alleviating effect. The writer of "Gossip" in "Electrical Industries" refers to the recent letter of Mr. J. E. Kenshole to the "JOURNAL" and the comments thereon respecting the attitude of certain Government Departments towards gas lighting [*ante*, pp. 267, 285] when departments associated with the work of the war are urging the public to use yet more gas for the purpose of providing greater supplies of explosives and liquid fuels. Our contemporary does not specifically say whether or not the Government Department responsible for the turning-out of gas lighting are justified in their action when other departments are appealing for a larger consumption of gas in order to assist with those things that are urgently required for defeating the enemy. He probably hardly cares to line-up with those contemptible persons who, animated by self-interest rather than national safety, would not lift a finger to help to destroy the power of the enemy. But he thinks he has a good set-off to Mr. Kenshole's complaint in the following statement, which if it proves anything at all is that the writer has disclosed a powerful incapacity for looking at things fairly and squarely in the light of actual conditions. He writes:

> In a case recently brought to our notice, a house wired for electric light was rented in the area of the South Metropolitan Gas Company; and when the tenant applied for the installation of a gas-stove on hire, he was refused it unless gas were used throughout the house for lighting. This is not the first case of the kind we have encountered. The Gas Company's action may be legal, but it is altogether contemptible. Very few tenants have the gumption to fight against coercion of this kind, or to get the electric supply undertaking to fight for them. The pious horror of the gas companies over the alleged preferential trading at Hackney becomes sheer hypocrisy alongside the bullying of householders to use a mode of lighting they do not want. If the electric-supply undertakings were alive to their opportunities, they would realize that the gas companies are making the way easy for the introduction of electric cooking.

The tall language and the tone of injury incorporated in this piece of foolishness are grotesque in the light of the facts of the current position. "Contemptible," "coercion," "hypocrisy," and "bullying!" And yet the electric light users have the choice of gas, coal, and electricity for cooking and heating purposes, but (notwithstanding that some mentally deficient persons think that electricity, no matter the temperature used, will save "meat") have a preference for the labour-saving, dependable gas, by which temperatures can be controlled to any desired degree!

The Real Position.

Let us examine the position from the Gas Company's point of view. They are in just the same situation as the electricity suppliers regarding the shortage of supplies of cookers and fires, and the scarcity of hands for fitting, besides which conveyance is difficult owing to the lack of men for attending to heavy goods. The result is they have to deal with applications for stoves and fires in what they consider to be the best possible manner for their undertakings. There is no "coercion," and no "bullying." The people who deserve their first consideration are surely those who have long been, and continue to be, their customers. It would be sheer folly to neglect them for others, who, on the return of easier conditions in the coal market, might send back the stoves on hire, or might later be foolish enough to fall victims to the solicitations of the electric-cooker canvasser. No gas company, however, with spare cookers and fires and any available labour, would refuse electric light users; and some are, in these times of stress, doing business with them on hire-purchase lines, which is preferable in their case to simple hire, seeing that possession of the stove ensures custom. There is another thing that must influence gas companies in this matter. Through capital restrictions, shortage of men at the works of contractors, and the number of gas-plant works now in Government hands for munition purposes, it has been impossible to seriously take in hand the question of plant extensions. Compared with normal times, the work done in this way during the war has been a mere dribble. Maintenance has been as much as some undertakings have been able to keep pace with; and this work materials and labour have made very costly. Last winter during the heating season, outputs in several cases on some days and weeks were 40 to 50 p.ct. in excess of the

corresponding days and weeks of the previous winter. During the cold months, many undertakings had to meet demands for gas averaging 20 to 25 p.ct. more. What would the electricity stations have done with such big erratic heating demand as this? But what is the result in the case of some gas undertakings for the coming winter? There are several that, with last year's experience before them, and the impossibility of extending their producing and storage power, have, much to their regret, had to cut-off dead for the time being the making of further connections of stoves and fires, so as to ensure full and constant supply to the present connections during the winter months. Again, there are other concerns with plant to spare, but oil supplies have been totally suspended by the Government, and until they see on the works surplus stacks of coal for winter use, they are chary of increasing their commitments in respect of supply. On the other hand, there are some gas undertakings, with surplus plant and stocks of coal assured, that are willing and pleased, providing they have the stoves and fires and men to fit them, to accommodate electric light users. It is all a matter of the individual position of the gas undertakings how, in these war times, they treat the business of additional cooker and fire demand. The writer of "Gossip" in "Electrical Industries" has yet to learn that fairness and prudence in business dealings are not "contemptible," and do not constitute "coercion," "hypocrisy," or "bullying;" and, unless he has the capacity for examining a question from all points of view, he should at least have sufficient courtesy to exercise a little discretion in his choice of expressions when dealing with commercial rivals.

LOCAL ADMINISTRATION.

With a view to economy, the annual report of the Local Government Board, already much curtailed, has been still further reduced in size, by the omission of tables, statistics, and other matter which has hitherto found place in its pages. Thus shorn, the forty-sixth report—relating to the year 1916-17—has recently been published.

Of the three parts, notice need only be taken of the last, which deals with public health, local administration, local taxation, and valuation. In the first place, reference is made to the report of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act. Some extracts from this report have been appearing in the last three issues of the "Journal." It is pointed out that, with the depleted staff, it has not been found possible to carry out fully the different lines of work under the Act which was performed before the war; and only the most urgent duties have been undertaken. An unusually large number of new works have required inspection and consideration. Among others, there has been a substantial increase in the number of tar-works registered, which has been almost entirely due to the rapid extension of the use of tar dehydrating plants in gas-works.

In the matter of loans sanctioned to local authorities, the policy laid down in the previous report has been strictly maintained during the past year. That is to say, in consequence of the vital necessity of ensuring that both capital and labour should be made available in the directions in which they could best favour the national interests, the stoppage has, as far as practicable, been secured of works in progress, and the postponement of new works, except such as were of pressing need, and the borrowing of money by local authorities has been restricted within the narrowest possible limits. As regards expenditure on works which had not been commenced, the loans sanctioned to local authorities during the year under review were almost entirely made for purposes connected with the war—*i.e.*, for plant for the supply of electricity, for extensions of gas-works, and plant to assist in the production of materials used in the manufacture of high explosives. Thus of the total loans (£2,721,475) sanctioned to local authorities, no less than £1,877,114 was for purposes in connection with the war. The total represents a reduction of £1,536,498, or 36 p.ct., on the amount of loans sanctioned by the Board in the previous year—namely, £4,257,973. During the three preceding years, the average total was round about £13,500,000. In addition to refusing assent to schemes which did not seem to them to justify the expenditure at the present time, the Board have, in cases where their sanction or approval was not required, endeavoured to induce the local authorities concerned to postpone action during the existing national emergency; and they are able to state that, generally, there has been a praiseworthy disposition to meet their wishes in this respect.

To assist them in dealing with problems which are likely to arise in the distribution of labour and employment, the Board are compiling a register of works to be executed after the war. To this end, a circular was issued last year asking for information as to works which might be undertaken by local authorities on the conclusion of the war, and as to those contemplated by other bodies or persons in the area within their jurisdiction. In response, a large number of returns have already been received; and those who have not sent on the required information are urged to do so without delay. Where the borrowing of money is involved, the early submission of proposals to the Board for consideration will avoid unnecessary delay when present restrictions on borrowing and on the execution of works are withdrawn.

Reference is made in the report to the Gas (Standard of Calorific Power) Act, 1916, which enables Government Departments to make Orders, upon the application of gas suppliers, for the substitution of a calorific standard for the illuminating standard prescribed by the Special Act relating to the undertaking. Under this, the Board have [as has from time to time been recorded in the "Journal"] made a number of Orders prescribing a calorific standard of 500 B.Th.U., and imposing upon the local authorities the obligation to supply gas at a pressure of not less than 15-10ths. Before, however, making the Orders, they ascertained from the Ministry of Munitions that the local authorities had taken the action contemplated under the Act for the production of benzol and toluol.

Under the Local Government (Emergency Provisions) Act, 1916, there has been a temporary cessation of the publication of the separate volumes making up the "Annual Local Taxation Returns." But a summary is being prepared for presentation to Parliament.

There is a *résumé* of the legislation of 1916-17, as affecting the powers and duties of local authorities. This includes the provisions for regularizing the position of employees on service with the forces, and for enabling those authorities who are subject to the Board's audit to dispense with the publication of an abstract of their accounts in a local newspaper.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Staveley Coal and Iron Works.

On Saturday, about twenty members of the Manchester and District Junior Gas Association had the pleasure of visiting the Staveley Coal and Iron Company's works. The party were met at the station by Messrs. F. E. Wright (the Manager of the Foundry Department), P. Wilson (the Manager of the new works), and J. Chambers (the Manager of the old works), who guided them round the foundry, lucidly explaining the various operations in progress. The visitors were interested in the casting of iron pipes for gas and water, and the method of testing pipes used for water supply. Other shops inspected were the shell-shop, where female labour is employed, and also the wood straw shop, where old pit-props were being cut up into wood straw, which is now so largely used by packers. It was interesting to learn that prior to the war large quantities of wood straw were imported from Germany; but now this work is being done in our own country, and at considerably less cost.

The party were invited to have luncheon in the Company's dining-room, and were there joined by Messrs. J. A. Wilson (the Manager of the coke-oven works, &c.) and C. E. Whitehead (the Manager of the chemical works).

Mr. S. Carter (Garston), Senior Vice-President, in proposing a vote of thanks to the Staveley Coal and Iron Company, and to the gentlemen present who represented the Company, said that about nine years ago the Association had the pleasure of inspecting the Staveley works; but he would venture to say that those who were there on the former occasion would to-day see that vast developments had taken place, particularly on the chemical plant.

Mr. W. Hill (Stalybridge) seconded the vote, and said that for the last 25 years he had been using pipes made by the Company. During the whole of this period he had never had occasion to make a complaint; and he was perfectly satisfied with the workmanship they had given him.

Mr. W. Buckley (Droylsden), the President of the Association, remarked on several of the items of the morning's visit, and added that he considered the most interesting part of the programme would be the afternoon visit to the coke-oven and chemical works.

Mr. Wright acknowledged the vote, and said the Company made every effort to turn out the best class of work. They had supplied castings to all parts of the world, and received very few complaints. The Chairman of the Company was a very progressive man, and possessed original ideas; and to-day they would see some of the results. The Company have five collieries, with an annual output of 2½ million tons of coal. These coals have had a high reputation in the markets for upwards of a hundred years.

Under the guidance of Messrs. Wilson and Whitehead, the party then inspected the coke-oven and chemical works. It was noticed that the fullest use is made of the various processes, and that what would be waste in other works is here turned to account. The guides took great pains to make the visit a success, and were called upon to answer a number of questions.

Obituary.—The death has occurred, at the good old age of 87, of Alderman Henry Laver, the Chairman of the Colchester Gas Company. It is interesting to note that the previous Chairman died at the age of 91 years.

Eastern Counties Gas Managers' Association.—The autumn meeting of the Association will be held in the Queen's Room at the Holborn Restaurant, at 2 o'clock on Friday, Sept. 28. The new President (Mr. J. H. Brearley, of Longwood) will be inducted to the chair; and he will begin his year's office by opening a discussion on "War Time Experiences of Gas Undertakings." War time has been prolific in unusual experiences; and so the subject should give rise to an excellent discussion.

THE CHEMISTRY OF COAL.

THE importance to gas makers of a great renewal of scientific activity in the chemical investigation of the composition and constitution of coal was the subject of an eloquent and lengthy address delivered by M. ROULAND recently before the Société Technique du Gaz en France. The following is a much abridged translation of the address as published in the "Journal des Usines à Gaz;" but it will be sufficient to show the emphasis laid by M. Rouland upon the national importance of more refined methods of investigation in the extension of knowledge of a complex material such as coal, particularly in regard to the more efficient use of the bye-products produced in its distillation.

Reviewing past methods of investigation, proximate analysis had consisted chiefly in determining moisture, ash, and coke, and by working upon a works' or laboratory scale, determining the yield of coke, gas, ammonia, and tar, and the calorific power of the gas by combustion with oxygen in the Mahler calorific bomb. The customary methods of ultimate analysis had been applied to determining the quantities of carbon, hydrogen, sulphur, and nitrogen in a coal, estimating the oxygen by difference. In reference to other methods, he cited the treatise "Le Gaz," by M. René Masse, as containing, up to the date of its publication (1914), the most comprehensive account of the scientific examination of gas-making materials which could be consulted. He laid especial stress on the inadequacy of the results of ultimate analysis to give the information which the gas-maker required. The results were expressed in terms of the ultimate elementary constituents of the coal. It was as reasonable to expect a naturalist to classify an extinct animal with only the finely ground substance of a bone before him, or an archæologist to date a cathedral from the dust of one of its stones.

In regard to the computation of calorific power from results of analysis, later investigation had sufficed to show the inapplicability of the so-called law of Dulong of 1849—viz., that the heat produced by a fuel was equal to the total of the quantities of heat produced by the combustion of the elements of which it was composed, leaving out of account the portion of hydrogen which formed water with the oxygen contained in the fuel. The "law," as Sheurer-Kestner and others had shown, was founded upon insufficient grounds. It was out of relation with the actual facts of the combustion of fuels such as coal, in which the chemical condition of the oxygen, nitrogen, and sulphur was an unknown quantity. The hydrogen might be combined with the oxygen or with the carbon; hence the results obtained in accordance with the Dulong law would be sometimes too high and sometimes too low, to an extent which deprived them of all real significance.

The results of ultimate analysis may be examined in reference to the fact that in the pure woody material, cellulose, the proportion of oxygen is one-tenth that of carbon; while in fuels which have undergone a greater degree of change—*e.g.*, anthracites—the proportion of oxygen is only one-fortieth of that of carbon. The comparative decrease in hydrogen is also appreciable, though much less marked. In cellulose, there are 139 parts of hydrogen to every 1000 parts of carbon; in coals, there are only from 75 to 40; in anthracites, only 40 to 25. Further, as oxygen disappears from a fuel (with age) more rapidly than hydrogen, the factor O/H, or $\frac{O+N}{H}$, becomes a characteristic of the fuel. In contrast with this is an analysis of two coals quoted by M. Grüner. Though of nearly identical composition, one (*a*) is a coking coal, the other (*b*) non-coking.

	a	*b*
Carbon	75·2	76·0
Hydrogen	4·0	4·3
Oxygen	16·0	16·0
Ash	3·0	3·3
Moisture	6·3	5·4

On the other hand, coals of very different composition exhibit the property of agglutinating during combustion. Their analysis gives no clue to their behaviour, which, it may be assumed, depends on the molecular arrangements of the constituents. Where fuels are classified, as they are by Ser, on the basis of their proportion of hydrogen over and above the quantity required to combine with the oxygen in the fuel, gas coals are those with the maximum of excess of hydrogen—*e.g.*, 3·5 to 3·4 p.ct.

Referring to the classical researches of Regnault in 1837, on the classification of mineral fuels, M. Rouland pointed out the conclusion that the proportion of oxygen in a coal was greater the more recent its origin; the proportion of carbon varying in an opposite direction. Certain anthracites which form an exception to this rule were probably the result of a species of metamorphism under the influence of volcanic change; but an exception of the opposite kind has never been met with—*i.e.*, the existence of true coal in deposits which have reached the anthracitic stage.

M. Rouland proceeded to impress upon his audience the invaluable service which was rendered to gas makers by the classification and tests of gas coals carried out from 1873 to 1875 by M. St. Claire-Deville, and subsequently supplemented by him to the extent of including the examination of 1818 different coals coming from 58 different sources. He quoted *in extenso* from M. St. Claire-Deville's previous papers, and reproduced the latter's table, which is a summary of these comprehensive observations. The latter is no doubt familiar to those who have followed the experimental work that French gas chemists have contributed to successive congresses of the Société Technique, but are quoted below in an English version as the result of converting, where possible, the metric measures into the customary British units.

The coals referred to in the table as Types I., II., III., &c., are identified by M. St. Claire-Deville as the result of a series of analyses, summarized in the following table, which gives percentage composition apart from the ash-content:

—	Type I.	Type II.	Type III.	Type IV.	Type V.
Hydrogen	5·06	5·37	5·40	5·53	5·64
Carbon	88·38	86·97	85·89	83·37	81·66
Nitrogen	2·00	1·00	1·00	1·00	1·00
Oxygen	5·56	6·60	7·71	10·10	11·70
	100·00	100·00	100·00	100·00	100·00

Turning to the more modern attempts which had been made to ascertain the true chemical nature of coal, M. Rouland instanced first the production by Berthelot of benzene, toluene, styrolene, naphthalene, and anthracene from acetylene, and the confir-

	Type I.	Type II.	Type III.	Type IV.	Type V.
	Average from Regions:				
	A and C.	A, B, C.	A, B, C.	A, B, C.	C.
Volatile matter (*ex* ash)	28 658	32·753	35·102	38·261	49·115
Distribution of products of distillation of 100 parts by weight of coal: Gas	13·271	14·054	14·931	15·950	14·349
Condensed water	4·204	5·109	8·089	8·152	14·370
Tar	4 556	5·486	6·149	6 989	7·547
Coke	75·294	72·188	69·943	66·570	60·872
Various and loss *	2·675	3·163	2·888	2·399	2·862
Total	100·000	100·000	100·000	100·000	100·000
Volume of gas (at 50° Fahr. and 760 mm.)—cubic ft. per cwt.	546·6	541·1	549·5	532·5	479·8
Consumption for 1 carcel (9·82 British candles) (50° Fahr. and 760 mm.) Dumas & Regnault. c.ft.	4·297	3 876	3·733	3·549	3·562
Quantity of light—British candles per cwt. of coal	1151	1374	1448	1477	1727
Density of gas (at 32° Fahr. and 760 mm.)	0·3368	0 3606	0·3803	0·4161	0·4485
Volumetric composition of gas: Benzol vapour	0·905	1·001	1·066	1·090	1·094
Unsaturated hydrocarbons	2·430	2·810	3·198	3 858	4·403
Methane and nitrogen	31·790	32·730	32·829	32·919	32·004
Hydrogen	57 041	54 720	53 409	50·439	48·252
Carbon monoxide	6·379	7 074	7·615	9·106	10·702
Carbon dioxide	1·055	1·265	1 483	2 188	3·145
Oxygen	0·400	0·400	0·400	0·400	0·400
Total	100·000	100·000	100·000	100·000	100·000
Benzol—lbs. per 1000 c.ft.	2·108	2·331	2·482	2·536	2 553
Coke—gallons per 1000 c.ft.	12·22	11·56	11·10	9·06	8·58
Temperature in hydraulic main ° Fahr.	133·3	135·5	144·1	154·0	175·2
,, retorts ° Fahr.	1624	1620	1616	1626	1569

* Includes graphite, cleanings from ascension pipes, matter absorbed in purifiers, &c.

mation of these experimental observations by Meyer. From his observations, Bethelot had developed his theory of the formation of the substances contained in coal tar on the basis of: (1) The decomposition of the coal at a heat gradually progressing just up to redness; and (2) the prolonged action of a higher temperature on the products of this first decomposition. According as one or the other of these conditions obtains predominance in the carbonization of coal, the composition of the tar undergoes corresponding variation. Under the usual conditions of gas making, it is at a high temperature that tar is formed, and thus the constituents of the tar conceivably result from the mutual reactions of a very small number of compounds upon each other at this high temperature—according to Berthelot, to reactions between methane, ethylene, acetylene, and benzene. Thus benzene and methane, as Berthelot showed, give rise to toluene when the two constituent substances are in the nascent state, and can be caused to act upon each other at a comparatively low temperature. At a great heat a mixture of methane and benzene gave not toluene but anthracene. Hence the formation of toluene at a relatively low temperature of distillation may be taken as pointing to the existence in the coal of substances which yield benzene and methane together in the nascent state. Similarly the action of two molecules of methane on one of benzene gives rise to the various xylenes. Moreover, from Berthelot's observation of the formation of styrolene (cinnamene) from benzene and ethylene, of ethylene from hydrogen and acetylene, of styrolene also from benzene and acetylene, and of benzene itself from acetylene, the natural question arises whether in this series of creations of hydrocarbon substances the basic substance is not acetylene. Meyer's experiments on acetylene, conducted on a very much larger scale, went far to answer this question in the affirmative, to the extent also of accounting for the formation of almost all the substances in coal tar through the agency of the various transformations which acetylene undergoes in the heat. In the presence of hydrocyanic acid (prussic acid), pyridine and aniline were obtained; only phenol bodies being those the formation of which does not appear to follow from this series of changes.

Pursuing the train of thought aroused by reviewing these observations, M. Rouland insisted that such work as that of Berthelot and Meyer is synthetic, and therefore imaginative. However active the imagination of the experimenter, and however fruitful his work may prove, it must be kept in mind that such a system of investigation cannot, from the nature of things, replace observation of the raw material (coal), which is the root of the problem. Hence more modern investigators—such as Hart, Bedron, Leo Vignon, Pictet, and Ramseyer—have sought to attack the problem at the other end; endeavouring to identify various constituents of solid coal by the employment of solvents such as alcohol, ether, toluene, aniline, nitro-benzene, pyridine, quinoline, benzene, &c.—all bodies of very different chemical character and ranging in boiling point from 80° to 238° C. Experiments on these lines have been supplemented by ordinary distillation by heat, but under a greatly reduced pressure—a method which is far less precise, since it may provoke decompositions, even though the temperature at which it can be carried out is very much lower.

M. Rouland concluded by impressing upon his audience the fact that such experimental work, capable of revealing the real molecular constitution of coal, is still at its beginning. Scarcely anything had been accomplished which raised our knowledge of coal from the very primitive condition represented by percentages of the elements which composed it or by the conclusions which had been formed from experiments on synthetic lines. What was needed in France was a National Coal Institute, liberally endowed with money, equipment, and men. Why, he asked, should it be necessary in France, where such researches had their origin, to refer to enemy institutions, the very names of which were repulsive in the mind and on the lips? It was necessary to proclaim without ceasing that the inventor, in collaboration with capital, was the creator of wealth, and that lack of foresight was paid for even more dearly by nations than by individuals. There should be unity of effort between gas makers and the coal-mining industry for the establishment of such an Institute. When this was achieved, the Government could not withhold its support from it; for it was M. Rouland's belief that, after the conclusion of the war, greater interest on the part of the State would be shown towards societies which represented the production of wealth, and their efforts would be supported for the sake of the whole community.

An Investigation by M. Versepuy.

M. Rouland was followed by M. Versepuy, who, in the course of a paper on the same subject, also uttered a plea for closer investigation of the proximate composition of coals, and proceeded to indicate certain directions in which more economical use could, and should, be made of the fuel resources of France. In regard to the chemical characteristics of coking and non-coking coals, it was generally taken that the best coking coals were those containing 5 to 6 p.ct. of hydrogen, 10 p.ct. of oxygen, and 4 p.ct. of free or excess hydrogen. In practice, such coals were found to contain from 18 to 20 p.ct. of volatile matter. Yet numerous discrepancies were met with—*e.g.*, coals of very different quality had the same carbon content. He instanced a good coking coal with 86·4 p.ct. of carbon and a lean coal with 85·8 p.ct.; also highly agglutinating coal with 79·4 p.ct. of carbon, and somewhat lean coal with only 0·5 p.ct. more. On the other hand, among Newcastle coals, it had been found that for 100 parts of carbon, two non-coking coals contained:

Hydrogen	4·75	..	4·45
Oxygen	5·28	..	7·36

In three coking coals, these proportions were:

Hydrogen	5·49	..	5·85	..	5·91
Oxygen	10·86	..	14·52	..	18·07

In four non-coking coals, they were:

Hydrogen	6·34	..	6·12	..	6·40	..	5·99
Oxygen	21·15	..	21·13	..	22·55	..	23 42

From figures such as these, it was evident that, as regards the ratios of hydrogen and oxygen to carbon, there were as great differences among non-coking coals as among the coking coals.

Even with a particular coal the coking property varied according to the method of heating; certain non-coking South Staffordshire coals yielding a hard coke of good quality if suddenly brought to a high temperature in closed vessels—a species of change which recalled M. St. Claire Deville's production of crystalline chalk (marble) by heating and cooling ordinary chalk in a sealed receptacle. M. Versepuy urged that the study of the action of solvents on coal was necessary to the problems of the coking process. All the experimenters who had examined coal with the aid of pyridine and quinoline were agreed that, while the extract and the residue had the same percentage composition, the extract was "cokeefiable," while the residue was not. Of the attempts which had been made to convert a non-coking coal into one possessed of the coking property, M. Hennebute, in 1904, had suggested the addition of a cement compounded of hydrates of carbon to semi-coking coals, but with what success in practice was not known. M. Boudouard had shown that oxidation of coal, by increasing the proportion of humic acid, diminished the coking property.

M. Versepuy proceeded to insist on the necessity in France to coke coals which would coke. If the total output of a coal bed over a short period of time were analyzed, it would be found that, of good coking coal, 20,000 tonnes were used for gas and electricity, 40,000 tonnes for railway and transport, and 80,000 tonnes in metallurgy. In the last domain, a large proportion was consumed in the gas-producers for the Martin furnaces, for which some metallurgists sought to employ only coals having more than 25 p.ct, of volatile matter. Such practice was sheer squandering of the reduced national resources, if no other means existed for obtaining the requisite temperature in basic furnaces. Continuous working gas producers yielded a gas of from 800 to 900 calories per cb. m. By injection of steam, this figure was raised to 1300 calories, which was about the limit imposed by the cooling of the fuel through the decomposition of water.

The remedy was to be found in the use of a producer operated in alternating periods with air and with steam—viz., a water-gas producer yielding gas of 2600 calories—and by distributing the two gases by separate pipes to the bed of the furnace, so that one set of pipes served as igniter for the other in case of momentary stoppage of supply. This system had been applied at Toulouse for furnace heating with complete success. Metallurgists required to experiment with industrial gases of 1300 and 2600 calories, with water-gas as an auxiliary, in order to be able to utilize lean coals mined within a few miles of their own furnaces, instead of sending these coals hundreds of miles in exchange for gas coals which were considered indispensable for the basic furnaces.

With an apology for trenching on the field of another industry, M. Versepuy declared that economy of coal was a vital matter, and that the waste of it could not be laid at the doors of the gas industry, in which no portion of its valuable constituents was better utilized. In Germany, he continued, Martin furnaces were very frequently fed with lignite, and in southern France were lignite beds, which could be used without previous preparation; while in Germany lignites could never be employed, as they were converted into briquettes for use in the producers of steel furnaces. The demand by electric generating stations for special coals adapted to burn in certain patterns of boiler furnace was another instance of waste. In a brief reference to low-temperature carbonization, and the hopes which had been expressed of producing light hydrocarbons suitable for internal combustion engines by this method, M. Versepuy said that the cracking of the oils from the distillation of Scotch bituminous shales was a process which should be proceeded with in preference, if the increased production of petrol in the United Kingdom was a matter of importance.

Institution of Gas Engineers.—It has been decided by the Institution of Gas Engineers to combine the Gas Components Committee and the Gas Heating, Lighting, and Ventilation Research Committee under the name of the Gas Investigation Committee. The Gas Heating, Lighting, and Ventilation Research Committee will form the Research Sub-Committee of the Gas Investigation Committee.

Melting-Points of Fire-Bricks.—Mr. W. M. Barr, in "Industrial Engineering," states that the melting-points of 45 samples of fire-brick have been determined in an electric vacuum furnace; the temperature being measured with an optical pyrometer. The following melting-points (in degrees C.) were determined: Kaolin, 1740; pure alumina, 2010; pure silica, 1600; bauxite, 1820; bauxite clay, 1795; chromite, 2180; magnesite brick, 2165.

COMMITTEE FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

Second Annual Report.

The Second Annual Report of the Government Research Department has been issued. The *précis* which accompanies it for Press purposes is worth reproducing as an introduction to a notice of the fuller document. It states that the new Research Department, under all the disadvantages of the strain of war and the shortage of workers, is trying to provide a permanent basis for research in this country and to co-operate with similar attempts in the Dominions.

The report indicates that there are three ways of organizing industrial research. The simplest is the case where a single firm can work out a problem, and itself fully exploit the results. In most cases, however, problems of industrial research will concern many firms—sometimes many industries; they will require the expenditure of large sums of money and the co-operation of many workers for long periods of time. But, if successful, the results will be of immense value. Most individual firms cannot undertake this long and costly process. Yet why should the State pay for the whole cost of winning new knowledge which will be valuable to business men? It is hoped the way out of the dilemma will be found by the establishment of "Trade Research Associations," to be constituted as needed for each industry or group of industries on which are, when possible, to be represented capital, management, science, and labour, and which are to be aided out of the million grant to be administered by the Department for the express purpose of establishing such Research Associations. One Association is just about to be constituted for the cotton industry; others are being brought into existence for the wool, flax, shale oil, and photographic industries.

There are also many cases where the problem is so complex, or else so immediately concerns the consumer rather than the producer, that co-operation between manufacturing firms is not possible. This is obviously the case with fuel. Hence the establishment of the Fuel Research Board which, under the direction of a distinguished man of science—Sir George Beilby—will itself conduct research. So, too, with the problems of fire-resisting materials and the determination of standards and constants. All this is direct work for the whole community acting through its special organ of research. It is interesting in this connection that the Royal Society has recently negotiated with the Department the handing over of the financial responsibility for the conduct of the National Physical Laboratory, where investigations of national importance are constantly going on.

The main lines of policy of the new Department are being slowly worked out. But it is also not neglecting immediately pressing problems. In glass, for instance, a great deal has been already done—three completely new kinds of optical glass have been discovered by Prof. Jackson. A research upon light alloys (aluminium, zinc, copper) will be of the utmost importance. Researches into the recovery of tin are expected to save the Cornish tin industry £30,000 a year. A large number of other researches are being aided or carried out by the Department.

The Universities will take their place in the new social tissue whose pattern is now being woven. At a considerable number, researches (aided or initiated by the Department) are now going on. At the Universities, too, the future research workers receive their training; and 36 (who would otherwise have drifted into some immediately remunerative work) were aided by grants from the Department in 1916-17.

The report ends by noting the altered attitude of manufacturers and men of business towards the claims of research and education, and reiterates the conviction that a sure advance in industrial science can only be made if the field of work is adequately surveyed beforehand, and an organized plan of attack worked out.

Lord Curzon's Report.

The report of the Advisory Council is prefaced by one signed by Lord Curzon, the Lord President of the Privy Council. In this, he refers to the fund of a million pounds which is to be spent over a period of five or six years; and, as already indicated, is to be expended on a co-operative basis. The Associations for Research will be established under the Companies' Acts, will be limited by guarantee, and will trade without profit. Contributions to such Associations will be allowed as a working expense for income-tax. The report mentions the transfer to the Department of the property of the National Physical Laboratory, together with responsibility for its maintenance and development. The scientific management will remain as hitherto in the hands of the Executive Committee under the chairmanship of Lord Rayleigh.

Mention is made of the appointment of the Fuel Research Board with Sir George Beilby as Director. Sir George, with marked public spirit, has accepted the post of Director, which, at his own request, will be without remuneration. The other members of the Board, who are also unpaid in this capacity, are: The Hon. Sir Charles A. Parsons, K.C.B., F.R.S., Sir Richard Redmayne, K.C.B., Mr. R. Threlfall, F.R.S. The Board will report through an Advisory Council; but it is the intention that it shall have executive powers within the limits of an annual budget approved by the Department. The Board has recently appointed an Irish Committee of Inquiry into Peat as a Source of Power. The Committee will meet in Dublin under the chairmanship of Sir John Griffith.

Regarding grants, approval has been given to aid in respect of 45 scientific investigations of industrial importance. Nine of these had already received aid during the financial year 1915-16; the remaining 35 were new proposals. Last year it was reported that grants had been approved to a number of individual students and research workers for the year 1916-17 to an amount not exceeding £6000. In the event, not more than £3550 odd was expended under this head upon 36 workers. Throughout, the work has suffered in amount owing to the war; and the Department were unable to expend more than £14,524 out of the £40,000 placed at its disposal by Parliament for the year 1916-17. During the current year £38,050 has been taken in the estimates, in addition to the fund of a million already referred to.

The Report of the Advisory Council.

The report of the Advisory Council (which is signed by Sir William G. M'Cormack, the Administrative Chairman) is an extensive document. It shows progress.

Research Associations and Researches Unsuited for Co-operative Action.

It first deals with the million fund for the Trade Research Associations. In an appendix, the Council give notes for the guidance of those desiring to draft the Articles for an Association, and a short statement of the conditions under which the Department would make grants to suit an Association when founded. [The report can be obtained for 3d., so that we will not attempt to summarize the information in this connection.]

As regards the constitution of the governing body or council of an Association for Research, it is obvious that capital, management, and science must have suitable representation. But the Council believe further that greater success and a wider scope of action will be attained, if provision is made also for the inclusion of labour. They think it important that the workers in an industry should be able to ascertain at first hand how science is applied to industry and how funds devoted to this purpose are expended, and that they should also be able to urge the importance of research which would result not so much in pecuniary gain as in the increased health and comfort of the workers. It is intended that the Research Associations should include as many of the firms in each industry as possible, but where there is so great a variety of applications as in the engineering industry, it may be found advisable to form a series of quite distinct Associations for research. On the other hand, it is quite possible that an individual great engineering firm having various activities of its own, might belong to two or three or more Associations. When it is found necessary thus to sectionalize an industry, it will be important for the several Research Associations to combine for purposes common to more than one. The Council have remarked that those industries which call for the most complex organization, and are most in need of scientific guidance, if they are to meet modern conditions successfully, are for the most part those in which the smallest progress has been made toward research on a co-operative basis. They refer to the large group of what may be called the chemical industries. At the one end of this group is found a growing movement toward financial combination—*e.g.*, among the highly developed heavy chemical and allied industries.

There are, however, important fields for industrial research which the Council can never hope to cover by means of Research Associations. Research into fuel is one of these. Every home in the land, as well as almost every industry, is directly concerned in the economy of fuel. For that reason it is simpler and more just that all should contribute through the taxes to the cost of the research. The Committee of Council have accordingly established the Fuel Research Board as a part of the Department. They hope to receive assistance if not contributions from some of the industries more immediately interested. The researches which are being conducted through the British Fire Prevention Committee and the Concrete Institute respectively into the fire-resisting properties and into the general physical properties of different kinds of concrete, are also cases which call for national action. The Council are assured that the same considerations hold good for the scientific problems underlying illuminating engineering. Where the conditions make it unlikely that any particular industry will undertake necessary research, it may be desirable for the Department to take action for the general good, with the help and assistance of the industries concerned. It will not be possible in these cases to delegate responsibility in the manner proposed for industries capable of combination in Research Associations. Far-reaching scientific investigations which are likely to affect several sections of the industry are accordingly more suitable for co-operative than for single-handed attack. There will still be ample room for private research by individual firms on the lines of their own special work. Indeed, they may be expected to gather many suggestions for this from the results of the co-operative investigations. On the other hand, the German chemical industry, with its powerful firms engaged in handling the primary raw materials through all their intermediate stages up to the manifold but closely related final products, explosives, dyes, essences, drugs, antiseptics, would not be suited for co-operative research, though it may be prepared to go far in the direction of financial fusion—a mere continuation of the previous line of development.

If, as in this country, conditions are in many respects specially favourable to co-operation in the conduct of research, the State is justified in encouraging development, the Council think, along these lines by means of monetary and other assistance. They find the justification for their proposals for Research Associations in these considerations. But when the firms have done all that it will pay them to do in the way of both private and co-operative research, there still remain lines of investigation which will either be sufficiently fundamental to affect a range of interests wider than any single trade, however large, or else they will clearly have a direct bearing on the health, the well-being, or the safety of the whole population. The two types are not mutually exclusive; but research of either kind falls, it is considered, into the class which must be undertaken by the State itself.

The Fuel Research Board.

By far the most fundamental work initiated during the year, so far as the industrial aspect of the labours of the Council are concerned, has been the appointment by the Committee of Council of a Director of Fuel Research with a Fuel Research Board to assist him in laying

his plans. Under this head the report proceeds: The question of researches bearing on coal and its uses had been before the Council in various relations since the beginning of 1916. Definite applications for grants had been received from professional societies and from research workers at universities. A Committee of the British Association appointed to promote fuel economy had also approached the Council with a view to applying for a grant; and it became apparent at this early stage that the great range and importance of research into fuel called for treatment in a comprehensive way. A memorandum on researches bearing on coal and its uses was accordingly prepared in May, 1916, at the request of the Council, and with the assistance of Sir Richard Redmayne (Chief Inspector of Mines under the Home Office).

In July, 1916, the Reconstruction Committee appointed a Sub-Committee on Coal Conservation; and the Council accordingly referred to that Sub-Committee for their observations six researches that had been proposed to the Council. The Coal Conservation Sub-Committee, in a letter dated Aug. 11, replying to this reference raised the question of their relations with the Advisory Council and the manner in which "co-operation between the two bodies can best be assured." They also urged the importance and immediate necessity of arranging for a chemical survey of the coalfields. The letter continued:

> It appears to my Committee to be essential to the most economical use of our coal in this country, and to the most advantageous marketing of it abroad, that there should be available a collection of reliable data giving the chemical analyses of all our different coals. Further, it seems to be essential that these analyses should be prepared upon a uniform basis, so as to be readily comparable. My Committee are of opinion that it will be necessary to go even further than this, and to collect data not merely as to the chemical composition of the coal, but as to how the coal will behave under a furnace test, and upon its relative suitability to various processes—*e.g.*, coking, metallurgical, steam-raising, &c.

This letter led to a conference in September between representatives of the Coal Conservation Sub-Committee and of the Advisory Council, at which the relations between the Sub-Committee and the Council were discussed; and also the question of how to make the best use of the services of the British Association Committee on Fuel Economy. The conference agreed that the Advisory Council should be responsible for the organization and conduct of all research bearing upon coal, whether initiated by the Coal Conservation Sub-Committee or not.

The conference with the Coal Conservation Sub-Committee was followed by another with representatives of the British Association Committee on Fuel Economy. It was proposed that the Advisory Council should establish a Standing Committee on Fuel to advise them as to proposals for research into the uses of fuel; and it was suggested that the membership of the new Committee should be in a large measure identical with that of the executive of the British Association Committee. The Council accordingly appointed a small Sub-Committee on Nov. 3, "to consider the constitution, personnel, and terms of reference of the proposed Standing Committee on Fuel." In consultation with the Chairman of the Council, and having regard in particular to the chemical survey of the coalfields of this country proposed by the Coal Conservation Sub-Committee and to the important and difficult developments in which this survey was certain to result, the Sub-Committee reached the conclusion—

> That the magnitude and importance of the research work in fuel, which will have to be undertaken either on the initiative of the Coal Conservation Sub-Committee of the Reconstruction Committee or of the Council itself, makes it essential to set up machinery which will be at once both more compact and capable of more rapid action than would be possible if the ordinary procedure were adopted of reports from Standing Committees to be considered by the Advisory Council and then submitted by way of recommendation to the Committee of the Privy Council.

This finding was endorsed by the Advisory Council and in due course by the Government, with the result that the Fuel Research Board was established with a Director immediately responsible to the Lord President, and with power to expend funds placed at his disposal by the Committee of the Privy Council, in accordance with a budget annually approved by that body after report by us on his proposed scheme of work. We believe that all informed opinion will rejoice at the selection of Sir George Beilby for this important post and at his free gift of the knowledge and experience of a life-time of scientific study and manufacture to the national pursuit of an inquiry that he has made peculiarly his own. On the establishment of the Board, the services of Prof. Bone, F.R.S., of the Imperial College, were retained with the consent of the College Governors as Consultant to the Board. We understand that the British Association Committee on Fuel Economy is prepared to place the valuable information it has collected at the disposal of the Fuel Research Board, and that the Director may anticipate the active help of its members either in their individual or corporate capacity as occasion may arise.

The Fuel Research Board have already presented their first report outlining their proposals for taking stock of the coal resources of each district, classifying according to their qualities the seams which are being worked, or which might, in certain circumstances, be worked, and ascertaining broadly the industrial uses to which the different kinds of coal are being put. It is intended, with the help of the coal-owners, to collect typical specimens of the coal seams of the various coal mining districts, and to examine and classify them by means of chemical and physical examination in the laboratory. On the more theoretical side, it is intended to conduct investigations into the nature and origin of the various types of coal, and into the chemical and physical behaviour of their constituents under the action of heat and other agents, beginning with the well-defined types of coal as they occur in commerce. Thus this side of the inquiry will be most readily kept in touch with the practical side, and the new knowledge of the scientific worker at once becomes available for practical application. This method of attack needs the establishment of suitable machinery for the supply of samples, and not less the labours of a number of scientific workers. In present circumstances progress in both directions must be slow; but so far as more urgent necessities will allow, the Director and the Board will put this plan into operation during the coming year.

The Fuel Research Board have also had under consideration a number of proposals for the utilization of peat, and have been in communication with the Department of Agriculture and Technical Instruction for Ireland. That Department has for many years kept alive in Ireland an interest in peat and its possible uses; and the Board cordially responded to its advances in this matter. At the same time, the Board have not been able to ignore the experiences of the past and the failure of many schemes to attain permanent commercial success on any considerable scale. Accordingly they have decided, after consultation with the Irish Department, and with the approval of the Committee of the Council, to appoint a small Committee of Inquiry to sit in Dublin. [The terms of reference are set out.]

The appointment by the Government of a Director of Fuel Research has greatly facilitated and encouraged the co-ordination of the activities of the several Departments of State which are directly interested in the supply of fuel of different kinds, and their most effective use. A considerable portion of Sir George Beilby's time has been given in consequence to the service of the Admiralty and the Ministry of Munitions; while the Board of Trade have recently sought the advice of the Fuel Research Board as to the fixing of standards of quality for town gas. We have always believed that the natural relation of ourselves and the Department to other Government Departments would be to act as the servant of them all, to supply accurate information and independent reports upon scientific problems submitted for investigation, and to leave to the administrative departments the duty of applying the knowledge we may be able to furnish. This proves to be the direction in which events are moving; and the appointment of Assessors from other Departments to our Council has undoubtedly helped to bring it about.

The work of the Fuel Research Board has been in the main preparatory. Neither body has yet done much in actual research, for they have been doing the careful thinking without which ideas are barren.

Domestic Heating.

The Council have, however, recommended that grants should be made for three pieces of research which are related to the work of the Fuel Research Board; and the Board have concurred, because they could be carried out without interfering with the general plan of operations. The first of these, initiated by the Sanitary Committee of the Manchester City Council, is being carried on at the Municipal School of Technology, and has for its objects the use of better methods of domestic heating and improvement in the ventilation of dwelling rooms. A grant has also been given to the Institution of Heating and Ventilating Engineers to enable them (*a*) to tabulate and print the result of five researches on domestic heating carried out at University College, London, during the past three years, (*b*) to carry out a research with a view to establishing co-efficients of heat transmission through standard building materials, and (*c*) to conduct an investigation on heat transmission from radiators. The Council have invited the Institution to add Dr. Lees to the Committee of Direction; and as a member of the Executive Committee of the National Physical Laboratory, he will assist them to avoid overlapping between the work to be done at University College and that conducted for some time past at Teddington into heat transmission through building materials of a light character.

Atmospheric Pollution.

The third grant made this year in the ultimate interests of fuel research will secure the continuance of the work begun in 1912 by the Committee for the Investigation of Atmospheric Pollution. The Committee has now been constituted a Committee of Advice to the Meteorological Office; and that office will become responsible for the expenditure of the grant and of other income available for the investigation. The grant is made subject to the condition that the number of local centres at present reporting to the central control station shall be maintained. With the consent of the President of the Local Government Board, the Council invited Mr. W. S. Curphey, the Chief Inspector of Alkali Works, to join the Committee of Advice. The collection and tabulation of careful records as to atmospheric pollution in different parts of the country should be extended after the war, and the statistics should supply in the future one of the means of gauging the work done by the Fuel Research Board in promoting methods of smokeless combustion.

Miscellaneous.

The report deals with many other subjects of more or less indirect interest to our readers. Reference is made, among much else, to what is being done in connection with research in glass manufacture, to the surveys that are being instituted into other fields of research (including metallurgy), and to the surveys of resources.

Refractories.

In a second part of the report, the Council allude to a number of investigations to which they have rendered aid—among them "Refractories." In this connection they say:

The Institution of Gas Engineers have long supported a research under Dr. Mellor into refractories, conducted at the Central School of Science and Technology at Stoke. The growth in this work has led the authorities of the school to approach the Department for aid towards the cost of a much-needed extension of their laboratory for refractories. The Council view the work of Dr. Mellor in this field with much sympathy; and they recognize that the problems connected with refractory materials call for greatly increased attention. Indeed, the matter is of such wide interest that a Refractories Conference has recently been summoned on the initiative of the Faraday Society at which no less than thirteen societies and bodies were represented, with a view to working out a co-ordinated scheme of attack on a national scale. The Council agree that nothing less comprehensive would be satisfactory, and await with great interest the proposals likely to be formulated by the conference. Any scheme to be satisfactory must find a proper place not only for the work which has so long been carried on at Stoke, but also for that more recently begun with valuable results at the National Physical Laboratory, as well as for that in contemplation at Sheffield and elsewhere. This problem affords an excellent example of the need for well-considered action. Refractories are a vital necessity for many difficult laboratory investigations, and in many diverse

industries. The difficulties to be overcome are too many and too varied to be adequately dealt with in one place or by a single group of workers. The need for co-operation and for the assignment of the proper work to each is obvious.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Report of the Council for the Year 1916-17.

(*Concluded from p.* 378.)

Work of the Technical Committees.

Having regard to the prevailing conditions last year, the Technical Committees of the Association have accomplished a good deal of work.

The Committee upon "Pipe Questions" last year collected the answers to a series of questions on the use of cast-iron, wrought-iron, and steel pipes, and published a summary of them as an appendix to its report. Many communications have been received from members in regard to suggestions and views given in this appendix. It was intended to prepare a critical report from the whole of the material available; but, while the Committee met twice with this object in view, it has been found impossible to give the necessary time for its completion, which must now be deferred until the war is over. Meantime, the President will be glad to receive further communications on the subject.

The "Instructions for the Fitting and Manipulation of Gas Heating and Cooking Apparatus," which were approved at last year's general meeting, have been printed and distributed. Members are desired to give these instructions as wide a circulation as possible, especially among state and municipal authorities. These instructions allow of the use of flexible connections to small movable burners, &c., provided there is a tap on the supply side of the connection, and the nozzle to which it is fitted is at a proper angle and position to obviate any sharp bending or kinking of the connections. The spread of the use of gas recently in circles unaccustomed to it, and to the want of the necessary care in the use of gas appliances, has led to a number of accidents through the flexible connection sliding off the nozzle. Herr Jäckel, of Plauen, has pointed out that the nozzles supplied by the various makers differ greatly one from the other in shape and dimensions; and he has suggested that the nozzles should in future all be made to standard pattern and size. These have been approved by the Council and are given in an appendix to the report.

The Association instructional and experimental works has had its information bureau kept busy with technical questions, to which answers have been given without fee provided they did not necessitate special research. Such questions have been dealt with since the outbreak of war at the Duchy of Baden Chemical-Technical Testing and Experimental Works; while scientific problems have been handled at the Chemical-Technical Institute of the Carlsruhe College. A large number of routine analyses have been carried out, and one or two trials of new plant at works. Some technical-scientific investigations have been completed, and others are in progress on the heat balance of ammonia compressing plant, and heat balances of various types of gas making plant. Other subjects upon which investigations have been finished include "The Determination of Nitrogen in Coal and Coke:" "The Formation of Iron Carbonyl in Compressed Coal Gas for Railway Carriage Lighting;" "Rendering Coal Gas Non-poisonous;" "The Supply of Secondary Air and the Course of Combustion in Inverted Gas-Burners;" and "Investigations on the Explosive Limits of Mixtures of Gas and Air, or of Gas, Oxygen, and Nitrogen." Also a large number of investigations have been made in regard to problems arising from the shortage of coal and gas due to the war.

While the holiday course of instruction for gas engineers, which had been provided annually from 1898 until the beginning of the war, has again been suspended, two eight-week courses of instruction have been held for foreman-fitters who had been wounded at the front. The purpose of these courses is to give the men a thorough grounding in their own vocation as applied to the gas industry, and to train those most suitable to become laboratory assistants. The course includes lectures on the valuation of gas coals, the efficiency of furnaces, and the general properties of gas and the phenomena of combustion, with practical exercises in the laboratory, and later on the gas-works, on the examination of fuels and the bye-products of gas manufacture, analyses of flue gases and coal gas, the determination of calorific power, and photometry. It is intended to repeat this course, and to initiate a course extending over several terms, for training incapacitated officers as illuminating engineers, gas engineers, and chemists for coke works.

The "Photometric Committee," under the chairmanship of Professor Eitner, had pursued its work of preparing rules for photometry in relation to new problems, and has brought it to a conclusion. Another matter has claimed the attention of this Committee. A conference was arranged at a joint meeting of the German Illuminating Engineering Society and the Architects' Association with the object of promoting co-operation between lighting engineers and architects. The Chairman of this Committee attended meetings of the Council of the German Illuminating Engineering Society held on Dec. 16 and Jan. 13 last, which resulted in the appointment of a new Committee to keep in touch with architects and to deal with lighting questions in conjunction with them. This Committee, which is known as "Committee IV., on Practical Lighting Questions," consists of Herren H. Lux (Chairman), Bloch, Bechstein, Dreschmidt, Eitner, Halbertsma, Lempelius, Meng, Monasch, Norden, Schumann, and Wedding. The Committee met on Feb. 3 last, and drew up rules for its procedure, which are open for comment and the suggestions of members of the Association. The questions with which the new Committee has to deal are of extreme and far-reaching significance to the gas industry, and will bring many new and very interesting problems before the Association's Photometric Committee, which it will not be possible, however, to deal with properly until after the end of the war. The Committee have issued in the year 22 lbs. of amyl-acetate for photometric use (in the Hefner standard lamp) and 28⅓ litres of palladium solution for detecting leaks in gas supply systems.

The "Water-Works Committee" reports that the volume of statistics for the year 1915 embodies returns from only 286 works, as compared with 415 in 1913 and 378 in 1914. It is hoped later to obtain returns from the works which have been unable to send them hitherto (owing to depletion of staffs) and to publish them in a supplement to the present volume. The Committee have decided for future issues to Germanize a number of terms of English, French, or Latin origin which have hitherto been used in these returns (such as centrifugal, plunger, differential, expansion, horizontal, étage, circa, à, and pro) by substituting for them words of purely German derivation. Obligatory re-testing of water meters forms the subject of an appendix to the report, prepared by Herr Götze, of Bremen. Answers to a circular of eighteen questions as to the effect of the war on the operation and development of water-works have been collected and put in the hands of the President of the Association.

Dr. F. Scheelhaase, of Frankfort, and Herr Terhaerst, of Nuremberg, compiled in the preceding year a report on, and rules for, the connecting of lightning conductors to water and gas pipes; and in view of the prohibition of the use of copper for lightning conductors, Dr. Scheelhaase has now prepared temporary rules to be followed while war conditions continue. These rules are reproduced, with the ordinary rules, in an appendix to the report. The Association have also nominated Dr. Scheelhaase to serve as their representative on a Joint Committee of a number of technical institutions, formed at the instance of the German Electrotechnical Association, to deal generally with the question of lightning conductors, especially in regard to agricultural buildings.

The Association have joined the Union of Technical-Scientific Associations which was formed last year, by co-operation of the German technical institutions representing engineers, architects, ironmasters, chemists, electrical engineers, and shipbuilders. The Association's delegates to this Union are Herr Hase, Prof. H. Bunte, and Dr. von Oechelhaeuser. The Union is a pan-German organization intended to deal with questions of legislation, agreement on fundamental technical matters, technical instruction, and all questions connected with technology, and to be at the service of State and municipal authorities, as well as all circles of the community. Particular branches of the general work of the Union will be dealt with by Special Committees, on which representatives of the Association will serve.

The thirty-seventh volume of Gas Statistics, relating to the year 1915 (or the financial year 1915-16) has been issued, and contains returns from 385 undertakings. Only 65 of these report a slight falling off in gas consumption; the remainder show for the most part a quite considerable increase.

Membership Roll.

The Association have lost six members by death during the year. There is a net gain in membership of all classes of nine in the course of the year—there being 1070 members at its close.

Thanks are expressed to the subscribers—a goodly list—to the Association's Fund for Scientific Objects. Among the names in the list are: The Gas Company, Berlin (which is presumably the German Administrators of the Imperial Continental Gas Associations Works in that city); the Gas-Works of the same Association at Hanover; the Frankfort Gas Company, and the "Gas-Works Company" at Strasbourg, which presumably is the German Administration of the French Company's works there.

District Associations.

The reports of the affiliated District Associations which are embodied in this annual report may be briefly summarised:

The Brandenberg Association of Gas, Electricity, and Water Engineers abstained, in view of the war, from holding their annual meeting as usual in March, and will either merely meet for the transaction of formal business at the time of the meeting of the parent Association, or will hold an autumn meeting. The year closed with a roll of 3 honorary and 183 ordinary members.

The Mid-Rhenish Gas and Water Engineers' Association met, for the first time since the outbreak of war, at Mannheim, on Sept. 23 last, under the chairmanship of Herr Göhrum, of Stuttgart. The proceedings were of the nature of an informal discussion on war influences; the points dealt with including the sale of gas on credit terms, measures of defence against air attacks on gas-works, and through retorts for moderate-sized and small works. In the afternoon, an inspection was made of the new

plant at the Ludwigshafen Gas-Works. This District Association had 247 members of all classes at the date of the meeting.

The Association of Gas and Water Engineers of Silesia and Lusatia held their forty-sixth annual meeting—the first since the outbreak of war—on Aug. 5, 1916, at Bad Reinerz. The papers read and discussed included: "The Importance of Gas-Works' Products for the Supply of Raw Material in Germany in War and Peace," by Herr Ohly, of Cologne; "Experiences with Coke Breeze as Fuel for Boilers with Undergrate Blast," by Herr Kayser, of Cologne; and "Artificial Desiccation in Relation to Important Food Questions of the Time," by Herr König, of Breslau. There was a discussion on the Presidential Address of Herr Hase to the parent Association the previous June, and an informal discussion on gas and water matters. The Association had 174 members of all classes on June 1, 1916. It was decided to hold the next meeting at Königshütte, in August, under the chairmanship of Herr Hofmann, of Oppeln.

The Association of Gas, Electricity, and Water Engineers of the Rhine Provinces and Westphalia held two meetings, which were well attended. The first was at Aix-la-Chapelle, on Sept. 23 last, when a paper by Herr Brüggemann, on the "Significance to Gas and Electricity Works of 'Summer Time' during and after the War," was read and discussed. At the second meeting, at Cologne, on March 3, Dr. Markgraf, of Essen, gave a lecture on the "Use of Coke in place of Coal for Industrial Purposes," and Herr Ohly presented a report on the "Army and Navy Requirements of Gas-Works Bye-Products, and the Effect of Sequestration Orders on their Prices," which led to a lively discussion. The Association had a membership roll of 367 on April 1 last. The Chairman for the ensuing year is Herr Rosellen, of Neuss.

The Bavarian Association of Gas and Water Engineers held their thirty-second general meeting at Würzburg on April 30 last, under the chairmanship of Herr Finkler, of Neukölln. Herr Zimpell, of Würzburg, gave an account of the local gas-works, and the following papers were then read and discussed: "Gas-Works and Coke-Ovens," by Herr Menzel, of Berlin; "Present Industrial Position of Gas-Works," by Herr Ohly; and "Peace Aims of Gas-Works after the War is Over," by Herr Gareis, of Bonn. It was decided to hold the next annual meeting at Traunstein.

The Baltic Association of Gas and Water Engineers held their forty-fourth annual meeting in Berlin on June 28 last year, in connection with the general meeting of the parent Association. This district Association has 175 members.

The sixty-fourth general meeting of the Association of Gas and Water-Works Engineers of Saxony-Thuringia was held at Leipsic on May 19 last, under the chairmanship of Herr Weisskopf, of Chemnitz. Herr Jäckel, of Plauen, presented a report upon the "Supply of Coal to Outlying Places," and Herr Ohly gave a lecture on the "Future Industrial Position of the Bye-Products of the Gas Industry." After a long discussion on various gas and water topics, it was decided to hold the next general meeting at Halberstadt.

The Lower-Saxony Association of Gas and Water Engineers held their sixteenth annual meeting at Altona on Sept. 23 last, under the chairmanship of Herr Pippig. No meetings had been held for two years previously; and the Chairman's address gave a review of the progress in gas and water supply during the past three years.

Central Gas Publicity Bureau.

The Central Gas Publicity Bureau, which after some years of propaganda work on an independent footing, has now become affiliated to the Association, held its statutory meeting of members on March 17. Its work has deviated during the past year from its usual objects. It has been much occupied with the demands on the gas industry which the war has called forth. War conditions have, however, in themselves provided a magnificent propaganda for gas, as is evident from the increases in the consumption of gas and in the number of meters in use which the monthly statistics collected and published by the Bureau have shown during the year under review.

The Bureau has extended its educational campaign by issuing two pamphlets—viz., one on "How to Prepare Meat, Fish, and Other Food in its own Juice only and without the Addition of Fat," the other, by Fräulein Rauschenbach, gas demonstrator at Weisbaden, on "The Use of Gas for Drying or Desiccating Fruit, &c." The Bureau has published information on the advantages of gas as a fuel in communal kitchens and in bakehouses. The Bureau has also collected particulars of the increases in the price of gas which war conditions have compelled gas undertakings to make. The information thus collected is at the disposal of gas undertakings needing it.

The Bureau, having its offices in Berlin, was in the best position to negotiate on behalf of the gas industry with government authorities in regard to questions of the supply of raw materials on which restrictions had been placed. Since the outbreak of war, the Bureau has also ascertained the coal requirements of German gas-works, and has negotiated with the authorities in order to ensure an adequate supply to all works. It is still in constant communication on this question with the newly-constituted Imperial Commission for Coal Distribution, and hopes that a satisfactory solution may again be found of the question of coal supply to gas-works which is still in suspense. As the whole of the staff of the Bureau, with the exception of the Director (Herr Lempelius) and the Registrar, was called up, its far-reaching work has been carried on with some difficulty. Its activities necessitate constant communication with almost every German gas-works. It was this latter circumstance which directed attention to the desirability of closer co-operation of the Bureau with the Association; and, after considerable discussion, the necessary modifications were made in its statutes to admit of its becoming affiliated to the Association in the same way as the various District Associations.

GAS AND MOTOR FUEL PRODUCTION COMBINED.

In the final portion of a lengthy paper on the "Thermal Decomposition of Hydrocarbons" submitted by him to the American Gas Institute, Mr. E. H. Leslie deals with the combined production of gas and motor fuel.

The author says that the great demand for gasoline in recent years, due to the rapid increase in the use of explosion motors in pleasure and industrial cars, has placed a premium on this product. The fact, too, that the great petroleum fields developed in late years, with the exclusion of certain Oklahoma and Wyoming districts, have been small producers of gasolines, has also made the motor fuel situation more critical. The result has been the development of two types of processes for the synthetic production of gasolines.

The first of these is the liquid-phase cracking process for heavy oils. The oil is introduced into a pressure-still and distilled slowly under 75 to 100 lbs. pressure. The lighter distillates are not amenable to such treatment, on account of their exceedingly high vapour pressures. If the temperature of an oil of kerosene grade, or even gas-oil grade, is raised to the initial cracking temperature in the neighbourhood of 360° C., the pressure for its confinement in a still is several hundreds of pounds—in fact, entirely incompatible with safety, when it is considered that a large still full of liquid is under treatment.

This state of affairs has led to the development of another type of process, the so-called vapour-phase processes, in which an oil is first vaporized, and then passed through a zone heated to a temperature of 500° to 600° C. The methods of Rittman, Hall, and Greenstreet are the best-known examples of vapour-phase processes.

Incidental to the formation of gasoline by these vapour-phase processes, a considerable quantity of a very rich gas is produced. With certain oils a furnace dealing with 500 barrels of oil per day produces 100,000 to 200,000 c.ft. of very rich gas per 24 hours. The composition of the gas depends on the nature of the oil; but contains 65 to 45 p.ct. methane and ethane, 30 to 40 p.ct. ethylene and propylene, and 10 to 15 p.ct. hydrogen. Its calorific value and candle-power are both high; and it would be a very suitable gas for the enrichment of blue gas or other poorer gases, such as high-temperature coke-oven gases.

It has often occurred to Mr. Leslie that the synthetic gasoline interests and the gas interests ought to work together, since the one provides what the other so much needs. This is particularly true from another viewpoint. The oil which is now sold for the carburetting of water gas is an intermediate cut between the burning oils and the spindle oils. It is eminently suited for cracking purposes and synthetic gasoline production. The vapour-phase cracking methods are as yet too little developed to exert any great influence; but their development is coming rapidly, and with it will come an increase in the value of so-called "gas-oil."

From the standpoint of the petroleum refiner, it is uneconomical to burn such a rich gas as the synthetic gas from his cracking processes. This is especially true in the natural gas fields, where a good gas is obtainable at 15 c. per 1000 c.ft., or in the coalfields where good soft coals are available in quantity. It seems, therefore, that it is logical, both from an economical and practical standpoint, for those who are interested in gas and those who are interested in gasoline to work together.

Trade Fallacies.

A series of articles dealing with the subject of trade fallacies, which have during the past couple of years appeared in the pages of "Land and Water," have now, after being revised and in some cases added to, been published in book form, at the price of 5s. net, by Messrs. P. S. King & Son, Ltd., of Orchard House, Westminster, S.W. 1. The author of the articles [which comprise a criticism of existing methods and suggestions for a reform towards national prosperity] is Mr. Arthur Kitson; and the book is presented with a preface by Mr. Francis Stopford, the Editor of "Land and Water." In this preface, a warning that they will be well-advised to forswear the volume, as their prepossessions will be shocked, is offered to those who are satisfied that British currency and banking, and her trading and industrial conditions, are all that they should be. This gives a good hint of the trend of the opinions which Mr. Kitson expresses; and to it we will merely add one of the main reasons which Mr. Stopford states decided him to originally accept the articles for publication—that the opinions were set out in such clear and straightforward language that a subject usually regarded as too technical and dull for a journal that caters for general readers, became not only comprehensible, but always interesting, and often fascinating. There are chapters on labour, capital, and the State; the coming trade war; State control of industries; and the psychology of the workshop. We are in hearty agreement with Mr. Kitson in the importance that he places, from an economic point of view, on the well-being of the working classes.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Low-Temperature Fiasco.

SIR,—I read with interest your leading article and Mr. John West's instructive letter giving definite working results of high and low temperature carbonization.

In common with other gas undertakings, we received from the Ministry of Munitions and the National Gas Council some instructions on the subject of increased tar output; and I at once went into the possibility of meeting their demands.

After giving this matter careful consideration, I concluded that any alterations in the system of working at the Macclesfield Gas-Works would result in a reduced total output of tar from the plant, since we are now obtaining 16 gallons of tar per ton of coal carbonized.

I do not know of any gas engineer who is in a position, unless he has had extensive experience in low-temperature practice, to make a definite statement as to the probable cost of working his plant so as to get only 9000 c.ft. of gas per ton.

Being desirous of obtaining as much assistance and information as possible, I communicated with the National Gas Council, giving them an average return of the tar produced per ton in last year's working, and the improved results with steaming—both, of course, with high-temperature carbonization. I also pointed out at the same time that it appeared to me that we were achieving the object which the Ministry presumably have in view, and without jeopardizing the position of the gas undertaking. I welcomed the offer of the National Gas Council to send an Inspector to discuss this subject on the spot; but, from their reply, I gather that the matter is postponed.

Prof. V. B. Lewes in his book on the "Carbonization of Coal" (p. 162) gives a table showing that with a temperature of distillation of 700° C. (1292° Fahr.), the output of gas would be 9000 c.ft. per ton with 15 gallons of tar of a specific gravity of 1·140. Taking these figures as a basis, I have made an estimate of what results I might expect if the plant were operated at this low temperature. This estimate is shown in the following table:

No. 1.—*Daily Output with Sixteen Retorts in Use.*

	Present Methods.	Low-Temperature Carbonization.
Coal carbonized per retort . . .	2½ tons	1¼ tons
,, ,, ,, day	40 ,,	20 ,,
Tar made per ton	16 gallons	15 gallons
,, ,, ,, day	640 ,,	300 ,,
Total make of gas per day . . .	630,000 c.ft.	180,000 c.ft.

No. 2.—*Daily Output with Whole of Plant in Operation.*

	Present Methods.	Low-Temperature Carbonization.
Coal carbonized per day	80 tons	40 tons
Tar made per day	1,280 gallons	600 gallons
Total make of gas per day . . .	1,260,000 c.ft.	360,000 c.ft.

It will be seen that the output of tar from the plant per day will be less than half the present output.

It is further apparent that, with low-temperature carbonization, it would be impossible to meet the demands of consumers unless the plant were doubled, which is, of course, out of the question at the present time.

Is it not due to the gas profession that they should now be informed of the reasons why such a drastic proposal was put forward apparently without proper consideration?

J. E. BLUNDELL.

Macclesfield Corporation Gas-Works, Aug. 30, 1917.

Great Expectations at Low Temperatures.

SIR,—The results of carbonizing tests at different temperatures that Mr. John West published in your columns last week are very valuable; and he has placed the gas profession under a debt of gratitude to him (the same applies to your leading articles on the subject) for giving the members some reliable information as to the actual effects of following the official direction for amplifying (?) tar production, which direction was, it seems, readily swallowed, digested, and endorsed by the Executive Committee of the National (or, as I have heard it called, the Irrational) Gas Council. There is one satisfaction about the position, that commonsense in the matter was soon restored to its rightful position, through representations made by those who knew, and by the eye-opening extra cost of the retrograde proposal—retrograde for all the purposes of the Ministry of Munitions and of that patient packhorse which delights in pursuing its onerous career under the dignified title of the gas industry; its greatest display of industry at the present time being in struggling along with its accumulated burden with the desire uppermost in its mind to see how long it can keep to the road and the load before reaching perdition. This would have come quickly enough with low temperature on top of all the rest.

Let us see. There are, according to the circular-letter I received, seven gas engineers on the Executive Committee of the Council, ten other gas engineers and managers were co-opted to help with their shoulders (and presumably brains), and a largely attended meeting of representatives of gas undertakings appear jointly to have accepted responsibility in what you, Sir, last week described as "The Increased Tar Production Muddle." The position is inexplicable with the galaxy of gas engineering talent that, it may be supposed (unless action was taken without the consent of the engineers), stood guarantee for the soundness of a recommendation which has revealed itself as possessing a very large vacuity. It is hoped these gentlemen were among the first to readjust official misconception. There has been some amount of money loss through the desire to be further patriotic, though patriotism was better served in the event by those gas engineers who are, as our theological friends would say, possessed by "plenary inspiration." But what about those who have thrown the dice and lost? Perhaps they ought to have known better. Perhaps they resigned themselves to their fate with the thought "Our's not to reason why, our's but to do and——." Of course, they hope to live; but they are asking among themselves, "Shall we get compensated for our losses?" Perhaps they will not care to disclose themselves as among those who were so enthusiastic that they proceeded innocently and faithful to command to incur losses. Perhaps they will not care for this so long as they can obtain recompense. But did they notice that usefully protecting word "approved" which looks like having been designedly placed in the phrase "to pay to *approved* undertakings." If not, then they will see that their claims, without their undertakings were "approved" before work started, have a good chance of finding their destination in the capacious departmental waste-paper basket. So much for that point, which does not give great hope.

There are one or two questions now I should like to put to Mr. West about his figures. The first is as to the relative calorific power of the gas when carbonizing coal at high and low temperatures. The gas of low-temperature birth does not come up to my anticipations in view of the temperatures and the gas yields from the same coal. Look at Table I. I should have expected that, carbonizing at 1793° Fahr. and making only 7272 c.ft. per ton, a higher calorific value would have been realized than 479 B.Th.U. from a coal that at 2562° Fahr. gave 11,491 c.ft. of 441 B.Th.U. That must have been a freakish sort of coal—in fact Mr. West describes it as of "poor quality;" and this can easily be believed. But in the next table we have a good quality coal, and something that makes one's sympathy go out to medium temperature carbonization, because its reputed ability to heighten the calorific power appears here to be grossly slandered, if my old friend Lewes (I wish he were here now to take part in the present discussion), Marshall, and others knew and know anything of what they have talked about. For see, Mr. West tells us that when carbonizing at 2120° Fahr. and making 13,387 c.ft. per ton from this good coal, he found a calorific value of 523 B.Th.U. Now that calorific value is 55 B.Th.U. *less* than when he was making from the same coal 512 c.ft. more, by carbonizing it at a temperature 439° Fahr. higher. Have the calorific figures got accidentally reversed? The comparison as given by Mr. West is—

Temperature.	Make per Ton.	Calorific Value.
2559° Fahr. ..	13,899 c.ft. ..	578 B.Th.U.
2120° ,, ..	13,387 ,, ..	523 ,,

I should like an explanation of the variation from expectation.

Then there is an omission from Mr. West's letter. He does not give us the analyses of the tars from the different coals as produced at the different temperatures. He will help us gas men to interpret his figures better if he will remedy the omission. Of course, this will not affect his point as to the total output of tar in relation to time and plant as distinguished from the make of tar per ton of coal.

As to the last table, I should like some explanation as to how it is that steaming effects such an increase as is shown in the amount of tar produced, with an analysis of the tar with and without steaming. I do not question the increase; I only want information.

As I desire to retain my berth, Sir, will you, for publicity purposes, allow me to subscribe myself as

NOTANDA.

Aug. 31, 1917.

Ideal Carbonization—The Race for it.

SIR,—The interest is deepening into most profitable knowledge towards what the late Prof. Vivian B. Lewes termed "Ideal Carbonization."

The questions involved, requiring their correct answers, are gradually cornering the systems which have not carbonized—nor ever possibly can carbonize—coal to yield anything like what is really contained in it.

Indications are at hand that we are possibly approaching the maximum volume of gas carrying its highest burden of hydrocarbon content, safeguarding the preservation of its limit in heat value, and attaining a substantial increase in flame temperature, without in any way impoverishing the quality, weight, and measure of the bye-products—thus bringing us nearest to the full solution of the title of a book: "A Ton of Coal and What we Get from it."

By some fortune—through a period of sadness forcing circumstances to meet urgent necessities—vertical retort carbonization has come into its undoubted own, in that the distillation of coal in the ascensive is yielding, and maintaining, by far the largest volume of gas per ton of coal carbonized.

The war has taught us (and will continue to teach for years to come) that we must not waste anything; and one of the greatest blessings that could possibly come to our country would be the utilization of heat in nothing but gaseous form, thereby extending by a few hundred years at least the life of the coal age of Great Britain.

We must, however, drop out of use all crude and murderous methods of firing with raw coal. The figures are appalling as between the best to be done and the worst, which latter we have hitherto preferred and favoured the most.

Time with its demands has created opportunities in which vertical retorts are showing their superiority over the "lying down" systems of carbonization. For some months now trial tests have been running with intermittent verticals under special steaming of gas charges; and some remarkably good results have been obtained and maintained. These trial tests are still in progress; and when completed the results will be given for publication.

When a volume of gas per ton of coal carbonized approaching in total heat value upwards of 9,000,000 B.Th.U., with nearly 37 p.ct. of

hydrocarbon content, and less than 5 p.ct. of inert gases can be obtained, the question naturally arises, Why has it not been done before?

There is a phrase "It is passing strange." Yet so far back as 1903-4 the Settle-Padfield process at Exeter gave continuously from 50 to 55 p.ct. of hydrocarbon content. The system, however, was without war conditions to assist it.

T. SETTLE.

Truro, Sept. 1, 1917.

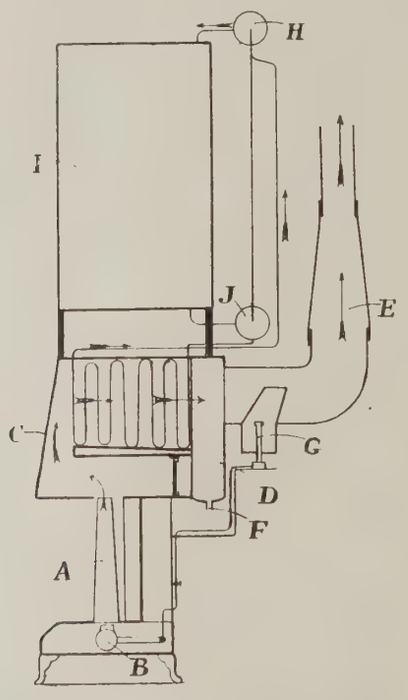
REGISTER OF PATENTS.

Gas-Heating Apparatus.—No. 106,468.

SOCIÉTÉ DU GAZ DE PARIS (Soc. Anon.), of Paris.

No. 2220; Feb. 14, 1917. Convention date, May 19, 1916.

This gas-heating apparatus comprises "a receptacle containing water arranged in such a manner as to be heated by convection by the products of combustion—the heated water passing into a radiator, where it disposes of its acquired heat by radiation and then returns to the heating receptacle, thus completing a closed circuit."



Society of Gas, Paris, Gas-Heating Stove.

A is refractory material rendered incandescent by the flames from the burner B. The products of combustion pass through the heating body C containing tubes filled with water, then through a flue D, and escape into the outlet passage E after losing the greater part of the water they contained, which collects in the bottom of a box, to be removed through an opening F. The absorbing surface above the refractory material is separated from it by a double plate of refractory earth or other bad conductor of heat. At the base of the passage E is installed an auxiliary burner G, surrounded by a chimney supplied with air through adjustable openings at its bottom. The hot water, after circulating in the heating body in C, passes to a collector H, then into a radiator I, which forms the radiating surface. From this the water passes to a collector J, and returns after describing a closed circuit.

The patentees do not claim as novel, *per se*, in a gas heating apparatus to cool the combustion gases down to the condensation temperature of the water vapour they contain and then to apply additional heat thereto to facilitate their discharge through a chimney or the like, since this is disclosed in their prior patent No. 11,502 of 1915.

Extracting Volatiles from Coal, Shales, &c. No. 107,824.

BUSSEY, C. C., of Brooklyn, New York, U.S.A.

No. 10,003; July 17, 1916.

According to this invention, the materials having hydrocarbonaceous ingredients are contained in a shaft or cupola, and a heating agent is passed through them; being produced by burning the material in the lower end of the charge after the volatile constituents have been extracted—the temperature of the heating agent being maintained at a predetermined degree of heat and the material moved through the apparatus by continuously removing the residue from the bottom, so bringing fresh material into the lower end of the charge.

The temperature of the gas is maintained within the retort at 800° Fahr., "so as to extract the desired amount of volatiles from the materials without producing any chemical change in them—that is to say, without producing breaking-down actions in the gaseous constituents while the volatiles are being extracted."

In order to effect a free and uniform expansion of the materials throughout the retort, and also in order that the producer gas may be evenly distributed, it is preferred to carry out this method under a partial vacuum. An exhauster is employed to create this, and also to act as a means for assisting in removing the mixed producer gas and volatile matters from the retort.

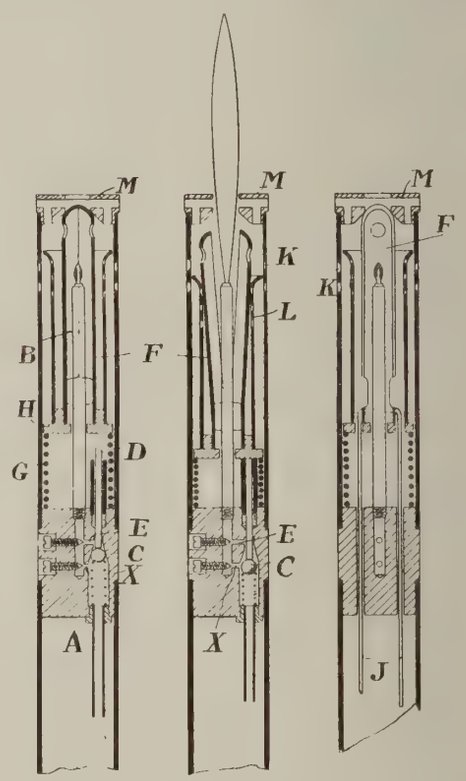
The patentee says he is aware that it has been proposed to employ a gas generator in connection with a still for extracting the volatile substances from hydrocarbonaceous materials without creating breaking-down actions in the gaseous constituents; and in this connection an apparatus has been proposed, in which gases from a generator are passed to a still in such a manner that a portion of the gases generated surround the still, and the remainder is caused to pass through the still—suitable means being also provided for removing the coke residue from a passage independent of the gas-generator. Such a structure is shown in patent No. 4572 of 1913. He is further aware that it has been proposed in a similar apparatus to employ a jet of steam to assist in conveying the gas from the generator to the interior of the still—patent No. 6613 of 1915. In yet another apparatus it has been proposed to pass material to be treated continuously through a vertical retort by feeding it in at the top and removing it at the base—heat being supplied by circulating gas through the middle part of the charge from and to a gas-heater; while in another apparatus the material is kindled at the bottom of a chamber and the material fed in at the top—the residue being removed intermittently by a door at the base of the chamber. In vertical gas-retorts, too, heated by producer or like gas circulating around the exterior of the retort, the coked product has been delivered at the bottom beneath the surface of water on to an endless belt.

Gas Lighting Torch.—No. 108,142.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 7165; Dec. 30, 1916.

This invention relates more particularly to torches fitted with a valve operable manually (directly or indirectly) to permit the passage of a supplemental supply of gas for producing a flash at the burner.



Keiths' Gas Lighting Torch.

The illustration shows one form of torch tube fitted with a shield for the pilot flame, with the shield closed, a corresponding view with the shield open, and a section at right angles.

The apertured walls of coaxial tubes K L present a baffled passage serving to ventilate the pilot flame, which is supplied by gas passing directly by way of the port X into the tube B from a connection A in communication with a gas container—a port E, normally closed by a spring-pressed ball-valve C, offering a passage for a supplemental supply of gas when the valve is unseated. To unseat the valve, there is provided a plunger rod D slidable in a tubular guide and movable to displace the valve when abutted by a disc H when the disc is drawn downwardly by pulling a wire loop J connected with a slidable handle or trigger device (not shown) at the lower end of the torch tube.

Normally, the upper end of the burner is enclosed within a shield or covering member constituted by a longitudinally split tube F, of which the sections tend to separate at the upper end and are connected at the lower end to the disc H. When the pilot light only is burning—*i.e.*, in the position occupied by the respective parts when the valve C is seated—the rounded upper ends of the sections of the tube F enter a conical cavity in the cap M of the torch tube, being pressed into this position by the action of the spring G bearing on the underside of the disc H. When the disc is pulled down, however, the sections of the split tube are free to separate. The downward movement of the disc also effects the downward movement of the plunger rod D and the unseating of the valve C, whereby gas is permitted to pass through the port E, so that a flash is produced at the burner—a free outlet being afforded to the flame by the separation of the upper ends of the sections of the tube F.

On the release of the handle at the lower end of the torch tube, the spring G lifts the disc H, so as to allow the valve C to become seated, and cut off the flash—closing the split tube F.

Separating Low-Temperature Tars without Distillation.—No. 108,339.

MACLAURIN, R., of Stirling.

No. 10,263; July 21, 1916.

The patentee says he has found by experiment that true low-temperature tars—such as are obtained by distilling coals under patent No. 24,426 of 1913, "are quite different in their constitution and characteristics from ordinary coal tars, and that more valuable products can be obtained by the separation of such tars or crude oils without distillation than by distillation." The crude oils or tars to which the invention applies are "characterized by the almost entire absence of the aromatic hydrocarbons of the benzene series, so characteristic of ordinary coal tar, also by the absence of naphthalene and anthracene, and of large percentages of free carbon." Vertical retort tars, he defines as semi-low temperature tars. To such tars the process is not intended to apply.

The crude oils or tars to which the invention does apply consist apparently, it is said, of two main groups of products—viz., a resinous group, and a non-resinous group presumably consisting of paraffins, olefines, and naphthenes, with some cresylic acid and related bodies. The resinous group is at the moment of unknown constitution. The separation to which the invention relates is simply the first rough separation of this type of crude oil or tar into these two main groups of products. He claims: "The separation of true low-temperature tars into two portions, by agitating with a hydrocarbon oil (such as paraffin oil), in which the resinous portion of the tar is largely insoluble, and allowing time for the resins thrown out to settle down, whereby a resinous product, and an oil partly freed from resinous material, is obtained."

Separating Low-Temperature Tars into Components without Distillation.—No. 108,448.

MACLAURIN, R., of Stirling.

No. 8603 of 1917; July 21, 1916.

The object of this invention is to separate crude oils and tars—such as those obtained by working patent No. 24,426 of 1913—into portions, without resorting to distillation. This invention is only intended to apply to "true low-temperature tars"—that is, tars very deficient in aromatic hydrocarbons of the benzene series and which are also characterized by their freedom from naphthalene, anthracene, and free carbon. Crude oils obtained by the low-temperature distillation of bituminous or canneloid coals are equally amenable to the process; but to tars rich in aromatic hydrocarbons the process is not intended to apply.

To a measured volume of the crude oil obtained by carbonizing at a low temperature a bituminous or canneloid coal, the patentee proposes to add about an equal volume of water, made slightly acid by the addition of about 3 p.ct. of its volume of oil of vitriol. The temperature of the mixed liquids is raised to about 40° to 50° C. and the whole well agitated, and then allowed to settle. The resin settles to the bottom and can be run off. The acid layer can be treated direct for the recovery of bases, or if still distinctly acid can be used again on a further quantity of oil. The top layer of oil can be further freed from resins and phenolic bodies by treatment with caustic soda solution; and, after washing, a lubricating oil or grease is obtained. The resinous portion can be further washed with a light paraffin spirit; and, after separating and drawing off any water or spirit adhering, it is ready for use as a black varnish.

Low-Temperature Distillation of Coal.—No. 108,343.

LAMPLOUGH, F., of Waterloo Place, S.W., and OIL EXTRACTORS, LTD., of Victoria Street, S.W.

No. 10,726; July 28, 1916.

This process for the low-temperature distillation of coal consists "in bringing superheated steam or other gaseous heating medium, preferably at low pressure, into contact with the coal to effect the distillation."

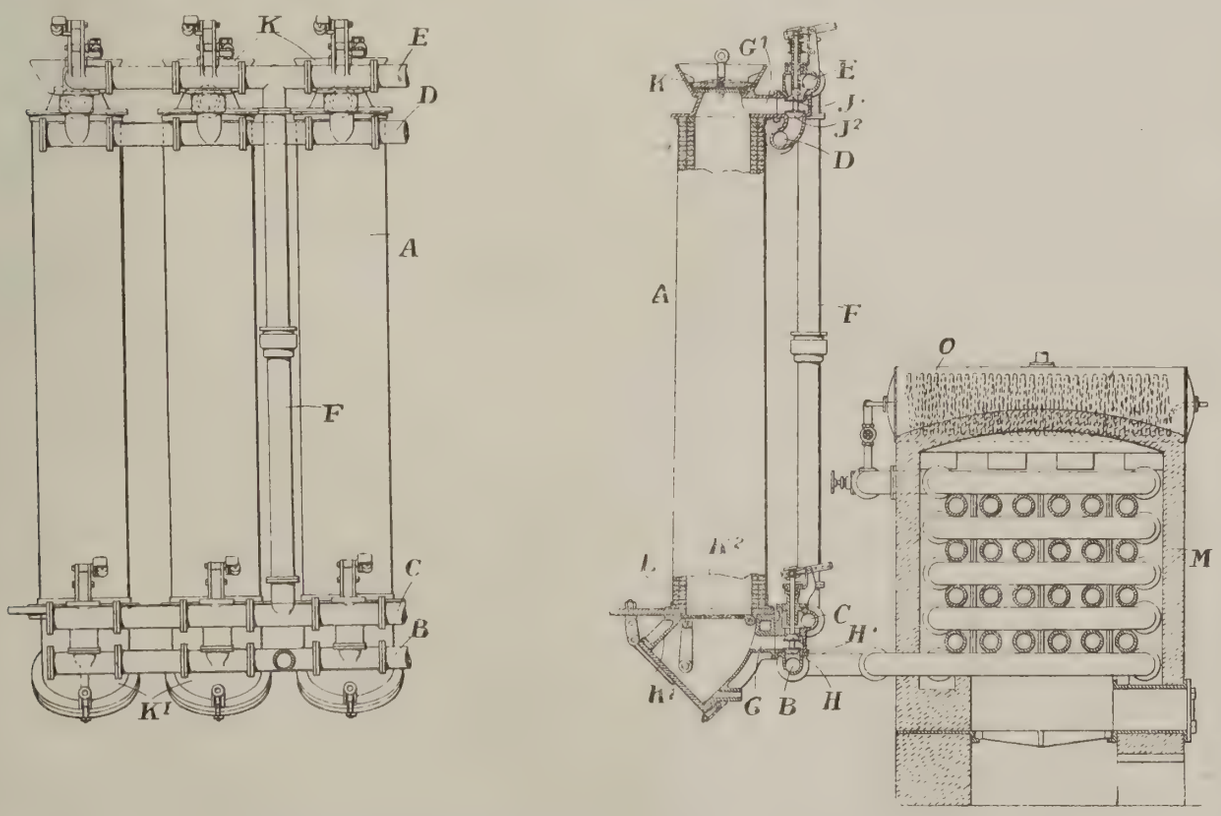
A front elevation is given of a battery of retorts arranged according to the invention, and a section showing, in addition, a vertical section through the type of superheater used.

The plant comprises a battery of vertical retorts A built with two parallel mains B C along the bottom, and another pair D E along the top. The main B is fed with superheated steam; whereas the main C, styled a "bye-pass feed," is connected by a down-take F with the top main E—the "bye-pass delivery." The main D is the gas-main. B and C discharge into a series of inlet ducts G—one for each retort. Communication between the mains and ducts is under the control of two opposed mushroom valves H H^1. Though not so shown, these are preferably arranged (like the valves J^1 J^2) co-axially with one another and with the stem of the valve H^1, made hollow so as to allow the stem of the lower valve H to pass through it. The two stems are provided with convenient control-levers, so that they may be moved in unison to close one or the other on to its seating and simultaneously to lift its fellow off its seating, or close both. The mains D E are similarly connected to an outlet duct G^1—a set of valves and an outlet duct being provided for each retort. The top of each retort is fitted with a hopper K, and at the bottom is a discharge mouth K^1, at the upper end of which is a perforated grate to support the coal. It is operated by a pivot arm L carried on a spindle and worked from a lever outside the discharge mouth.

The steam for the battery is provided by means of a superheater M, normally fed by exhaust steam from any steam-utilizing apparatus through a control valve. The top of the superheater is furnished with an evaporator in the form of a drum O built into the roof, so as to receive some of the waste heat from it. The drum (connected with a donkey-boiler or other source of live steam) contains a coil connected at one end to a water supply—for example, to a pump—and at the other end (by a valve) to the inlet of the superheater.

In use, the retorts are charged with coal, and steam is admitted at the bottom of the retorts—the degree of superheat ranging from about 200° C. to about 800° C. for the purpose of extracting the ammonia after distilling off the oil. The steam is of low pressure; but the coal is "distilled to the degree, and in the manner already known as the low-temperature distillation of coal."

Normally superheat is admitted from the main B through the valve H into the bottom of each retort, and the distillate escapes through the duct G^1, under control of the valve J, from each retort into the gas-main D. Normally the valves H^1 and J^1 are closed; and if the retorts are equally packed, all will be approximately equally heated. This, however, rarely is the case, and in result some retorts receive more steam than others, and in some the action tends to proceed relatively too rapidly and in others relatively too slowly. When, therefore, it is seen that the action in one retort is proceeding too slowly, one or more of the valves J^1 are opened slightly, and the corresponding valves J slightly closed. This diverts into the bye-pass delivery E some of the hot gas which otherwise would have been delivered into the gas-main D. At the same time, the valve H^1 on the retort where matters are proceeding too slowly is opened, and hot gas from the other retorts passes from the main E by way of the down-take F and the main C into this last retort to promote the distillation there.



Lamplough's (Oil Extractors, Ltd.) Low-Temperature Carbonization Plant.

MISCELLANEOUS NEWS.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Half-Yearly General Meeting was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. H. E. Jones in the chair.

The Secretary (Mr. Chas. W. Braine) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

Shadows.

The Chairman said it became his duty to propose the adoption of the report and accounts. In doing this, in the fourth year of this gloomy war, the accounts reflected a good deal of shadow, but behind that some little sunshine. Among the shadows, they had to regret the death of the former Secretary and Manager of the Mitcham and Wimbledon Gas Company, Mr. Benjamin Green, who for 46 years faithfully served that Company. He was a man who was very much respected in the district of Mitcham, and one who did yeoman service to the Mitcham Company in helping to bring it to the fine condition in which they found it when it was amalgamated to the Wandsworth Company. The Company had now 583 men at the war; and from among them with others they had lost the nephew of Mr. Page, one of the Directors—a bright young fellow who was on the engineering staff.

A big increase in gas sales.

The report opened with one of the most reassuring features that could be given as to the progress of the business. In the half year, there was an increase of no less than 9·7 p.ct. in the sale of gas, compared with the corresponding half of 1916. In the first quarter of the half year, the increase was much greater. As long as the cold weather lasted, up to March, the increase as recorded in their books was 15 p.ct.; and it might have been more, if they had been provided with the means of dealing with such an accentuated demand, because it kept at full winter peakload (as he had said) right away up to March, owing to the cold weather. Neither the revisions of the purchases of material (though they adopted very expensive expedients) nor the condition of the plant, which had been heavily worked during the previous year, admitted of their dealing with the emergency with the freedom that ordinarily they would have expected to do. The first year or two of the war, the Government authorities, by cutting down the public lighting and the show lighting of shops, and then by means of the Summer Time Act, did much to modify the handsome increases that the Company had always enjoyed. Therefore, when in the third year they came plump on a demand for gas which was entirely unexampled in all their experience, it took them rather by surprise. The reason for this was that, during the three years of previous comparative stagnation, they had been meeting a great demand for cooking and heating stoves in the district. He foresaw, and foretold in one of his addresses to the proprietors, that this would mean at some time a great demand for gas for fuel purposes. Then they caught it with a vengeance; and he must say that some of their consumers were very forbearing and tolerant. The Directors and their officials could only be sorry for them, because the position could not be helped—the war having taken away the men who would otherwise have remedied their troubles. But this state of things revealed what the Directors considered was perhaps one of the happiest outlooks for the business, because in better times it would mean an enormous development due to the reliance of the ordinary population upon gas. The real secret of the additional demand was that they could not get coal. Probably when the old conditions were revived, their customers might be better off in that respect; but he was one of those who thought that they would still cling to such a handy means of cooking their food and heating their houses as was provided by merely turning a tap.

The statutory dividends, and a dip into the reserve fund.

The revenue, in spite of this considerable increase in gas consumption, showed a profit of only £22,465, which meant that they had had to call upon the reserve fund to the extent of £10,862, besides mopping-up the small balance of cash they had in hand—£2403—in order to pay the proprietors the statutory dividends. These statutory dividends were not very shabby ones, as he thought the proprietors would agree. They were recommending on the "A" stock, a dividend at the rate of £7 5s. p.ct. per annum; on the "B" stock, £5 15s.; on the "C" stock, £5 1s. 6d.; on the Wimbledon stock, £5 2s. 6d.; on the Epsom stock, £5 15s.; and on the new ordinary stock, £5 1s. 6d. Although these were debased dividends, owing to the fact that they had during the war raised the price of gas by 9d. per 1000 c.ft. at various stages, a company which paid a minimum dividend of over 5 p.ct., even after it had been reduced by the operation of the sliding-scale (which reversed the dividend as the price went up), could hardly find a great deal of which to complain, although personally as a proprietor he could wish it the other way, and he could still more wish it the other way for the sake of their employees, who under the profit-sharing system only got 2½ p.ct., whereas they had 7 p.ct. before the war.

An insufficient increase.

He told the proprietors at the last meeting that he could not possibly lead them to hope for so good a sheet as they then had before them; and he indicated that it would be necessary to raise the price of gas, which they accordingly did in the past half year to the tune of 6d. per 1000 c.ft., which to one like himself who had been practising in the gas business for 45 years seemed an enormous jump. But he was bound to tell the proprietors that the increase was not enough; even with the 6d., the price was too low. The price of gas in the Metropolis was now about 3s. 1d. per 1000 c.ft. Their price in Wandsworth, including the 6d. advance, was only 2s. 6d.; it was slightly more in Mitcham, and more still in Epsom. That, however, was not nearly enough. Coal alone accounted for an increased expenditure of £44,220; and, when he told the proprietors that the whole sum required for dividend and interest was only about £35,000, they would see that coal in a single jump had swept away more than the amount. As an alleviation, they had from residuals an increase of £17,826; but, on the other hand, they had an increase in oil (which was a most extravagant extra cost) of £12,342, which left them on materials alone with £38,736 to the bad. In addition to this, the war food bonus amounted to £10,777 extra for the half year; and he was bound to tell the proprietors that in the present half year this would be some £5000 more, because of the recent addition that had been made in it at the request of the men, to bring it up to the level of what the Government had allowed the railway men. If they took these various figures, and allowed for a saving which they unwillingly made on distribution of £6586, and the omission from the account of £1366, which they saved as a capital charge, or rather they did not save it, but they put it off for a time, and (though most accountants thought it should come from capital) meant to carry the amount to revenue in the future, they had a net addition to the expenditure side of the revenue account of £59,500. Against this they had £17,826 extra from residuals and £22,914 extra from the sale of gas, which gave them a net deficiency of £18,760. If they had had this sum to add to the £22,465 profit, it would be seen that it would have been quite unnecessary to draw from the reserve fund to give them the same balance for dividend.

The relation of increased capital to increased gas consumption.

It was no use discussing a company's working unless they compared very jealously what additions were made to the capital account. It would be found in their case that they were modest enough—such as the new items of expenditure for distribution. They were perforce small, because of the scarcity and dearness of material, the difficulty of obtaining what they had got, and the high price of, and difficulty of finding, skilled labour to enable the fitting of meters, stoves, and the like. They would have been only too glad to have laid out more money in pipes throughout their district to deal with the unforeseen and sudden growth in the sale of gas. But this had been quite impossible. The total addition to capital, it would be seen, was £23,788, which meant 2·4 p.ct., whereas the sale of gas showed an addition of very nearly 10 p.ct. As long as they pursued this route, they were not likely to overlap the capital account. That day the capital stood at 7s. 6d. per 1000 c.ft., which was certainly the lowest of any company of which he knew in the South of England, possessing as they did a considerable fleet of steamers, barges, and road steam transport plant for conveying coals to the inner stations.

The need for more capital.

He did not think there was anything to labour in that part of the accounts; but it brought him to the question of providing more money. They had overspent the capital account by £72,554. He wished to dwell on this because of their special meeting, at which he was going to ask for capital powers. The capital account had increased this year over this time last year by £45,000; and their stocks of coal and products by £43,325. They had had to raise money by loan from the bankers for the purpose of acquiring a large steamer, because they were met in the middle of last half year with a great shortage in the stock of coal due to the effect of the drastic limitations in the sailings of steamers, which had run them down from 100 p.ct. to only 60 p.ct. of their carrying power. It became immediately necessary to add this 40 p.ct. After some difficulty, they found a fine, handsome, new and well-built steamer, which cost them £96,500, which was between three and four times what it would have been built for in normal times. Even at this price, they found it paid by running at less than half what the outside price was now for hiring steamers—if they could get them. They could not always get them, when hiring even at the rate they paid on some of them—the high rate of 20s. per ton for the service which, he told the proprietors a year or more ago, they had carried on for less than 3s. by their own boats as they were able to run before the war. Then, again, the insurance on these steamers had gone up very much. It meant an amount in the future of something like £15,000 in a single half year. But it would be folly if, having bought these steamers (three of which at the market price to-day were worth quite three times as much as they cost the Company), if they did not insure them not only up to the cost price, but up to the price necessary to replace them if sunk. The Directors had to protect the Company's property in this way. They did not do this quite early enough; and in an accident they had, the assessor ruled that the Company should bear part of the loss, because the real market value of the steamer was nearly double what she stood at in their books. They had now insured quite up to the value of the boats. The £96,500 for the new s.s. "Lightfoot," they had put to a suspense account, because they wanted to see where they were in reference to the capital account, as controlled by the Income-Tax Commissioners. Ultimately it would go to capital. It stood now against the bank loan of £303,000. This consisted of the £96,500 for the steamer; war loan £38,000, which was a mere matter of exchange; and then some £170,000 the balance for general purposes. In this very account they had £124,000 in the single year of excess capital required for running the "show." Their bankers were very accommodating, obliging people; and they had helped the Company very much in the past, by being ready to lend money at a little below the rate they would have had to pay for new capital. Of course, the bankers did not care to lock up too much money in a trade over which they had no control; and so it would be necessary to replace in the bankers' hands a considerable portion of the money they had had from them. This was why the Directors had sent out a notice of a special meeting, at which he should submit certain resolutions for supplementing the capital.

The Deputy-Chairman (Mr. R. Garraway Rice) seconded the motion.

The Depreciated Value of the Depreciated Dividend.

Mr. J. E. Allen said he did not rise to criticize the Board of Directors. As a matter of fact, he himself was some fifteen to twenty years

ago a member of a board of a gas company; but, as their average age was then 68 years, the proprietors would not be surprised to learn that he was the sole survivor. But he was speaking on behalf of the shareholders in this and other companies. In his view, they had been exceedingly badly treated by the Government. He understood from a friend of his who was managing-director of the largest gas company in the world, that gas companies were doing a great deal of valuable work for the Government in supplying the raw materials for high explosives, and that they were not getting a fair market price for their bye-products. He understood that the Government department concerned came in and pocketed these things, and paid for them the price it thought fit. [The Chairman: Yes.] Unlike other people in business, when gas companies sold their chief commodity at a higher price, they got lower dividends. It would be a good idea to apply the same principle to other businesses, and then see what other people had to say about it. There was another point. The proprietors in this concern were getting a somewhat less nominal dividend than they had had in previous years—£5 1s. 6d. p.ct. on the Wandsworth "C" and the new ordinary stock. That was not the whole truth; it was not much more than half the truth, because £5 now would only buy about as much as 55s. or 60s. did three years ago. This was not due solely to the war, or to the scarcity of things. It was something beyond their control or the Company's control. It was due to the fact that they were living now on a depreciated currency. The Treasury notes were marked £1 and 10s. They were not really so. Behind this 160 odd million nominal worth of Treasury notes and certificates, there was only 28½ millions of gold. He was not going to say that the £1 was only worth 5s.; but, as a matter of fact, the number of notes in circulation had been going up almost weekly from the first moment they were issued. At the same time, prices had been going up. They were now paid their dividends in depreciated currency. Three years ago, they were getting nearly six sovereigns per cent. for their dividend; now they were only going to get five Treasury notes, with their low purchasing power. On the Stock Exchange, their shares had depreciated by about 25 p.ct. He gave 112 for his; and they were now worth about 85. If they had to realize their shares, they would get 85 Treasury notes for them, which were worth as much as fifty sovereigns were three years ago.

The War Loan—The Time for Financial Revision.

Mr. W. Allard, J.P., said he always listened with considerable interest to the incisive remarks of their Chairman on the balance-sheet. He was sure he might say, on behalf of the proprietors, that they were extremely glad to see the Chairman there that day as keen and as dauntless as ever. Advancing years appeared to make no visible impression upon him; yet a bigger burden had fallen upon no man in the gas industry than upon their Chairman. He liked his speeches, because they were characterized by an optimism which he considered to be reasonable and sane—"reasonable and sane," because Mr. Jones did not put out of sight the difficulties and the dangers that still confronted those engaged in the gas industry. They were up against times when the war was not yet over. He observed that the Prime Minister always took a long view of the course of the war. The long view was the safer one to take. Therefore, there were still considerable troubles ahead of the industry. If he was critical over one point, he hoped the Chairman would bear with him. The Directors, he saw, made an investment of £38,000 in 5 p.ct. War Loan. He would ask the proprietors to forgive him mentioning that he happened to have been closely and financially associated with the National War Savings Committee for over a twelvemonth, to assist the Chancellor of the Exchequer in floating the War Loan. He recollected very well the line that the Chancellor's appeals look both to private individuals and to companies and corporations. He asked for savings and balances of profits, and anticipated savings and profits. He (Mr. Allard) scarcely thought that anyone who had overdrawn at the bank on Dec. 31, 1916, to the extent of £140,000, and on June 30 last to the extent of £303,000, could be said to be in the way of having any anticipated balances or profits in the immediate future. The investment from the patriotic point of view was most praiseworthy. That he supposed could be its defence. But the last War Loan was not the only War Loan that would have to be subscribed; and it was just as well to understand there would be a War Loan in the immediate future; and probably another subsequently. The Chairman might say to him, and it would be justifiable, that in 25 years' time the £38,000 would be paid back, and the only loss would be the difference between the amount of interest received less income-tax, and the amount the Company had arranged with their bankers. It might also be said that gas companies of lesser degree and even greater companies had subscribed to the War Loan. The South Metropolitan Gas Company had subscribed as much as £237,500, although the last balance-sheet showed temporary loans to the extent of £815,000, besides the £237,500 for War Loan. But there it was. Why he drew particular attention to this point was that subscribing to the War Loan was a distinct service rendered by the Company to the Treasury. But did the Company get any easement of their affairs from the Treasury or the Government? He read the other day (July 24) a leading article commencing with these words:

> **How many men in the gas industry have ever stopped, in the rush and pressure of current circumstances, to inquire whether they know of any other industry that is so oppressively financially conditioned and handicapped in these times as the one to which they themselves belong. They would have difficulty in finding another.**

These were sentences taken not from a sensational newspaper, but from the leading newspaper in the gas industry. They were sober truth. To his mind, these words in such a newspaper increased the difficulties of gas directors in raising fresh capital. Companies could not invite investments so long as there was no answer to the question "whether there was any other industry that is so oppressively financially conditioned and handicapped in these times as the gas industry;" for the inevitable tendency and influence of a sentence of that kind in such a paper was to further depress the existing prices of gas shares. He should have liked to have heard from the Chairman—this was one of the few omissions from his speech—that there was to be a resolute attempt to press on the Board of Trade, and indeed to insist upon, so far as practicable, some alleviation to the gas industry. He need not go further into these conditions. They were fully set out—and admirably set oue—in the article in the "Gas Journal;" but he would quote a few sentences:

> **The raw material of the industry is coal; and the coal industry is allowed to charge 4s. per ton extra (the Welsh part 6s. 6d.) in order to cover war expenses. The gas industry has to pay this additional charge per ton—running, without the extra paid to the Welsh and Forest of Dean collieries, to some £3,600,000 a year upon 1913-14 costs. It has to pay more for all the materials, the goods, and the labour it requires, including those that are essential to the making of the products needed by the Ministry of Munitions and the fertilizer necessary to the intensifying of the production of food. While the industry has to pay these higher wartime costs, with no allowance made for them, as in the case of the coal and sulphuric acid industries (so preserving their return upon capital), it has been decreed that it must be content with lean prices in present circumstances for the products required for munitions and for food production. The prices the farmer is to be paid for his cereals are controlled, but at figures that give a very good margin for his increased expenses; and it is the gas industry that has to supply him at a (having regard to costs from coal to acid, lime, wages, &c.) low price with the fertilizer that enables him to largely increase the produce from a given area of land, and the profits from that enlarged produce on the high-scale price allowed.**

He saw that the Chairman of the South Metropolitan Company (Mr. Charles Carpenter, D.Sc.) did not think that, in the midst of war, was the time to ask for a revision of the sliding-scale. He thought Mr. Carpenter underrated the capacity of the Government. In his (Mr. Allard's) opinion, the time had arrived when the gas companies—in fact, the whole of the gas industry—could bring its influence to bear upon the Board of Trade, in order to obtain some alteration of its conditions, one of which was the sliding-scale, which had taken a considerable jump backward. As to the question of leaving the discussion to the end of the war. First of all, they had no knowledge as to when the war would be over. And whenever the war was over, there would be a congestion of questions to be settled, and whoever waited until that time would get a slight hearing. They heard talk of some 100 million pounds being spent on rehousing after the war; they knew that education would come up for greater expenditure; they knew there must be a settlement with all the railways. Problems of this kind, and other war problems, would come to the front. Therefore, he did press upon the Chairman the urgent necessity of approaching the Board of Trade in this matter, and urging it upon them with all the influence of the gas industry.

The Chairman asked what direction Mr. Allard thought the movement should take. There was a lot of criticism; and it would help him personally in connection with the National Gas Council if Mr. Allard would indicate the particular shape he would like this to take. They must put some tangible proposition forward. One of the characteristics—he would not call it a merit—of the sliding-scale was that it linked-up the consumers of gas with the shareholders in a mutual bargain. They might complain as shareholders, but the consumer had the right to complain too. He could agree fully and firmly with what Mr. Allard said in his opening remarks. The Treasury first of all stopped the Company from raising capital, and then grudgingly admitted the issue of a small quantity, while the War Department exacted from them services which demanded plant and capital; services from their staff, and the products of the plant, which they took at their own price. Lord Moulton had freely and candidly stated that the gas industry had enabled the Explosives Department to put the forces of the country in a position to maintain the war. Their contribution to the War Loan was a small thing compared with that; for the War Loan simply meant that the bank lent them the money and took the interest. But as to the other sacrifices that had been made, could they have done more? They received no reward. And when a member of the National Gas Council went to the Board of Trade about this matter, he was told that, inasmuch as the sliding-scale was a bargain, they would have to examine into every case by itself, because each presented its own individual conditions. The sliding-scale now existed almost universally; but the maximum or fixed-price companies were in a worse condition; for when they exceeded their fixed price, they must go on selling at a loss. There was no margin that could be put on the consumers in their case, as there was in that of the sliding-scale companies. The only thing he could see that they could ask the Government to do would be to take the companies' dividends upon their shoulders, and let the companies carry out their behests and requisitions with the knowledge that the shareholders would then be saved their dividends. The Government, however, were not likely to do that. If they did, it would mean introducing control into the industry, which might be considered undesirable and irksome. Whatever they did in this chaos—this enormous conflict that was going on in Europe—they could not make the conditions last more than to the termination of the war, and then be replaced again. One thing which a company having taken the sliding-scale with the standard price fixed always contended for was that, the capital having been subscribed on the faith of the standard price, on no account should it be reduced. Regarding the processes that had been developed for the service of the nation, the plant and processes would abide with the gas industry after the war; and, with his everlasting optimism, he was going to look upon the future working of these plants, after the Government had ceased to take their products, as being perhaps one of the most encouraging aspects of the gas industry. Reverting to the question of the sliding-scale, he was constantly at meetings where the leaders of the gas industry were gathered together; and he declared he was absolutely bewildered by the multitude of the counsel that was given on the matter; and he was certainly puzzled to know in what way the Board of Trade in its present congested state could take up the work of reviewing the question in every gas company of the kingdom. It was hopeless, even if Parliament would sanction it; and he thought that what Parliament would say was: "You must put up with your loss as well as the rest."

Pension Scheme Suggested.

Mr. Harwood suggested the formation of a pension scheme in connection with the Company. He attended the meeting of a progressively and excellently managed gas company the previous week,

at which it was decided to establish a contributory pensions scheme in connection with the co-partnership scheme; and it seemed to him to be a happy idea.

The CHAIRMAN remarked that the best possible use to which accumulations under the co-partnership scheme could be put would be the provision for old age; and when the system was introduced into the Commercial Gas Company, it was regarded as one means of providing for old age and misfortune. He thought what Mr. Harwood suggested was worth consideration; and, in happier times, he hoped they would introduce some such system as that indicated.

The motion was unanimously carried.

DIVIDENDS.

Proposed by the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the dividends mentioned in the opening address were unanimously passed.

INCREASE OF SECRETARY'S SALARY.

On the proposition of the CHAIRMAN, seconded by Mr. ALLARD, the salary of the Secretary was advanced by £100 a year. It was pointed out by the Chairman how with the shortage of staff, the increased burdens of war time, and the extra work connected with the shipping, the duties of Mr. Braine had considerably increased.

Mr. BRAINE, in his acknowledgment, mentioned that he had passed his majority as Secretary of the Company and the old Wandsworth and Putney Company.

Special Meeting—Stock and Borrowing Powers Authorized.

A special meeting was then held "to authorize the creation and issue of new ordinary stock, and to exercise the borrowing powers of the Company in such manner as the meeting may approve."

The CHAIRMAN said he had explained to the proprietors that they were not going to spend the money, but required it to pay off the bank, so that they were already paying interest upon it. Out of it perhaps they would be able to afford to increase the distribution system, for the plant was in good order, except for some additional retorts at the works, which would increase Mitcham by 50 p.ct. However, whatever was provided in this way would be met by increased sales. The Directors thought it better that the bonds to be issued should be terminable; so that the high rate of interest paid during the war would be got rid of after the war by paying them off. The first resolution referred to the unexercised borrowing powers of the Company [see resolutions below]; and in place of debenture bonds, they proposed to issue repayable mortgages. The second resolution referred to the unexercised borrowing powers. There was a balance of borrowing powers in connection with the £150,000 ordinary stock which the proprietors had already authorized the Directors to issue. This carried £50,000 debentures, of which nearly £17,000 was raised, leaving £33,316. But they did not want the power to raise by permanent debenture loan but by terminable mortgages. No. 3 resolution went the "whole hog," and asked for authority to raise from time to time £150,000 of new ordinary stock, which was the balance. They were not likely to raise it during the war, because it was not terminable. They would have to go to Parliament to make it so; and some of it might have to be cancelled as against a repayable loan. There were the borrowing powers in connection with this £150,000; and the £50,000 in this connection (this was the fourth resolution) was not likely to be called in question or be exercised in future for perhaps the next twenty years. Therefore the passing of the resolution was a formality to place the Directors in a strong financial position, so that the bank would be safeguarded. The first resolution was:

> That the Directors be, and are hereby, authorized to borrow on mortgage of the undertaking from time to time sums amounting in the whole to £34,050 in exercise of the borrowing powers of the Company which at the present time are exercised by the issue of debenture bonds for the like amount, when and so far as such bonds shall be hereafter paid off, such mortgages to be issued on such terms and conditions, and to be repayable at such dates as the Directors think fit, and when fully issued to be in lieu of debenture stock to the amount of £34,050 being the balance remaining unissued of the £66,000 debenture stock, bearing interest at 4 p.ct., which the Directors were authorized to create and issue by the resolution of the proprietors passed on the 4th day of March, 1913.

The DEPUTY-CHAIRMAN seconded the motion; and it was carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the second resolution was passed as follows:

> That the Directors be, and are hereby, authorized to borrow on mortgage of the undertaking from time to time, in respect of the unexercised borrowing powers of the Company in regard to the £150,000 ordinary stock which the Directors were authorized to create and issue by the resolution of the proprietors passed on the 4th day of March, 1913, sums amounting in the whole to £33,316 11s. 5d.; such mortgages to be issued on such terms and conditions, and to be repayable at such dates as the Directors think fit, and to be in lieu of debenture stock to a like amount, bearing interest at 4 p.ct. per annum, being part of the debenture stock which the Directors were authorized to create and issue in respect of the unallocated capital by resolution passed on the said 4th day of March, 1913.

On the motion of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the third resolution was passed:

> That the Directors be, and are hereby, authorized to raise from time to time the sum of one hundred and fifty thousand pounds (£150,000) further part of the "unallocated capital" authorized by the Wandsworth, Wimbledon, and Epsom District Gas Act, 1912, by the creation and issue of new ordinary stock not exceeding in amount, with premium (if any), the before-mentioned sum, in accordance with the provisions of the said Act, and under such terms and conditions as they may think fit.

Moved by the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the fourth resolution was passed, as follows:

> That the Directors be, and are hereby authorized, to borrow on mortgage of the undertaking from time to time in respect of the £150,000 new ordinary stock authorized to be created and issued by resolution passed this day sums amounting in the whole to £50,000, such mortgages to be issued on such terms and conditions, and to be repayable at such dates, as the Directors think fit.

On the motion of Mr. ALLARD, seconded by Mr. J. G. GLOVER, a hearty vote of thanks was passed to the Chairman and Directors, and the officers and employees generally.

HORNSEY GAS COMPANY.

Price of Gas Reduced.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

THE CHAIRMAN'S STATEMENT.

The CHAIRMAN said he thought the Directors might fairly congratulate the proprietors on this occasion upon the excellence of the accounts which they were privileged to present to them. The small attendance was the most direct and complete compliment that the Directors could receive in this matter. It would be noticed, in the first place, that there had been a gratifying increase in the business—to be exact, one of 6·69 p.ct.—and although there was nothing very abnormal or sensational in the different items of account, they would amply repay scrutiny and consideration by the proprietors. These were anxious times; and mere results, without a study of the causes producing them, would hardly satisfy a careful investor. But however closely they might look into the accounts, he felt perfectly certain nothing would be found in them which would not tend to reassure them from an investment point of view, and to inspire them with encouragement as to the future of the undertaking. Now, the value of the position was a comparative one, because they knew quite well that in the case of the more important gas undertakings there had been a very serious depreciation of their prosperity, and such a change as to render the outlook very precarious; and the larger the undertaking, the more markedly was this becoming the case.

THE ACCOUNTS.

Going through the accounts rapidly, and endeavouring to select the salient items, he would first point out that they had now about £155,000 of capital which could be issued to meet the development of the Company. This was a satisfactory feature. However favourable the past three years might have been for applications to Parliament, he did not think this favourable atmosphere continued; and the undertaking was fortunate which had made provision for its capital requirements at the present time without contemplating further application to Parliament. It would be seen that the total capital received amounted to £276,563; but in calculating the capital employed, for the purposes of administration, this must be reduced by the sum of £25,000, which was a purely nominal addition under the powers of the last Act, for money transferred to capital from the carry-forward, upon which no interest or dividend was chargeable. Making this deduction, it transpired that the amount of capital per million c.ft. of gas sold per annum employed by the Company stood at the exceptionally low figure of £427 This was a factor of such importance as to govern the figures that followed it as they passed on through the accounts. On capital account there had been expended during the past six months £3027; and this was depreciated by the amount of £849 which had been written-off meters. Considering that they were just completing a very important reconstruction and re-arrangement of works, this was not a large amount to have spent; and it was quite inconsiderable when taken in connection with the increase in the business, to which he had already referred, of over 18 million c.ft. in the six months. Turning to the revenue account, of course, the comparative changes were important. Coal, oil, and coke had cost them £6712, or nearly 28 p.ct., more. The main rise had been in connection with oil, which had increased by some 200 p.ct. The rise in the actual cost of coal only amounted to 2s. 8d. per ton as compared with last year. He might, however, point out that, as compared with pre-war conditions, roughly speaking all the Northern Suburban undertakings were upon one common footing. The cost of coal had in each case been increased, in round figures, by 50 p.ct. The different items charged by way of repair and maintenance were important as qualifying any profit subsequently arrived at; and he might tell them that in these accounts they had been kept up to a proper figure, and that nothing had been gained in the accounts by any improper reduction of these items. The only other matters on the debit side of the revenue account to which he need call attention were the two final ones—allowances to dependants of employees on active service, and appropriation to benefit fund. These had increased by £1010. But he was perfectly certain that the proprietors would be reconciled to this increase, as it represented an eminently proper principle in the treatment of a matter which commanded the sympathy of everyone. On the credit side of the account, gas and rental of meters and fittings had brought in £5325 more, and residuals £2804 more. The total increase in receipts had amounted to £8169. On the other hand, the expenditure was £5599 in excess of the comparison period; and so the profit was £2570 greater. It was only fair to say that in the period with which present results compared there was a small deficit of £250.

GOOD NEWS FOR CONSUMERS.

There were a few ancillary statistics which would no doubt interest the proprietors. They had sold 12,553 c.ft. of gas per ton; and as for the major portion of the time no oil had been used, this represented a very moderate reduction upon the amount made per ton when the oil was available. Oil cost to-day practically 1s. per gallon, as against something like 2½d. before the war. The Company had a reasonable quantity in stock by way of provision for the requirements of the winter. So far as they could see, in fact, the Directors did not anticipate that they would have to make further purchases in so very un-

favourable a market—certainly not in the immediate future. The unaccounted-for gas was under 5 p.ct. The other fact which must be borne in mind in connection with the revenue account was that the Company's total increase in price since the war began was 4d. per 1000 c.ft. As would be seen from the report, the dividends were maintained at a substantial figure; the loss which the proprietors had incurred during the whole of the past troubled three years having been confined to ½ p.ct. of their dividend. He would content himself with saying now that it was the immediate object of the Board—and they had a reasonable confidence in connection with the matter—to restore to the proprietors this ½ p.ct. He trusted they would be able to do so. The selling price of gas shown in these accounts was 3s. 1d. per 1000 c.ft.; and at this price they were selling gas—in a district in the North of London, divorced from the advantages of water-carriage—at the same figure as the South Metropolitan and the South Suburban Companies. That day, however, the Board had decided to reduce the price, in common fairness to the proprietors; and this would mean that, with one single exception, the Hornsey Company would be selling the cheapest gas in the whole Metropolitan area—be its competitors big or small. He thought they would agree that this was no mean achievement, in the face of the difficulties of which the proprietors were cognisant, and which the Directors had more keenly to recognize in their administration of the Company's affairs. To get to the summary of the matter, they brought £11,799 into the net revenue account; and this was supplemented by £10,338 the profit for the half year, and £121 for interest. For income-tax and interest on deposits and debenture stock, a sum of £3469 was needed; and £1000 was transferred to the special purposes fund account. This left them with a balance of £17,790. When they had paid the dividend, which would require £5057, there would remain to be carried forward £12,733, or £934 in excess of the amount brought into the account. He did not think there was anything else to which to call attention until the balance-sheet was reached; and there it would be observed that they had, under the different items enumerated, cash in hand to the amount of £18,264. It would also be seen that the amounts standing to the credit of the special purposes fund and the reserve fund were invested, and so were available. Some undertakings had handsome figures to the credit of these funds, but the amounts were not invested; and when money was not invested in these days, one could very easily guess what had happened to it. This was the position as it stood to-day. He would, however, like to emphasize the fact that, of all the Companies in the Metropolis, with one single exception—and he did not know how long this would preserve its distinction—the Hornsey Company had succeeded in selling gas in these troublous times at the lowest price. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. A. F. Phillips) seconded the motion, which was at once carried unanimously.

THE DIVIDENDS.

The CHAIRMAN then moved: "That the sum of £1645 16s., less income-tax, for the payment of the half-year's interest on £65,832 5 p.ct. preference stock to June 30, 1917, be set apart, and that the same be paid accordingly; and that a dividend at the rate of 12 p.ct. per annum on the 10 p.ct. "A" stock, and at the rate of 9 p.ct. per annum on the 7 p.ct. consolidated stock, for the half year to June 30, 1917, subject to income-tax, be, and is hereby, declared payable."

Mr. J. M. MILES seconded this, and it was agreed to.

VOTES OF THANKS.

The CHAIRMAN proposed a hearty vote of thanks to the Engineer and General Manager (Mr. J. W. Buckley), the Secretary, and the other officers and the staff. He remarked that it had been his privilege that day to present a very favourable set of accounts to the proprietors; but it was no more than justice to say that, whatever excellence attached to these accounts—and very much did so attach—was primarily due to the splendid work that had been done by Mr. Buckley. There was no officer more vigilant; and he could not call to mind one who in a greater degree possessed that most valuable quality of foresight and prescience in anticipating difficulties before the precise moment at which he was confronted with them. It was largely due to this fact that the undertaking stood as well as it did that day. Of course, an engineer had not only to deal with the ordinary difficulties which his training and experience would lead him to expect, but he had to tackle problems which were only very faintly indicated in advance, though they might be vital to the operations he conducted. In every item he had mentioned to them, there was evidence of the work of their Engineer and General Manager in the past, and of his effective skill in the administration of the works in the present. The proprietors owed him a very hearty vote of thanks. With regard to the other members of the staff, no one was spared at a time like this. The Secretary had served them loyally and well; and the same might be said of the whole staff.

Mr. G. W. CAREY, in seconding the proposition (which was cordially agreed to), said he thoroughly endorsed all that had fallen from the Chairman.

Mr. BUCKLEY, responding, remarked that the half year had been a most strenuous one. Everyone connected with the Company was proud of the fact that they were able to sell gas at so low a figure.

Mr. F. G. PILLEY, moving a vote of thanks to the Chairman and Directors, pointed out that there was evidence in what they had heard, and in the report, to show that each member of the Board had rendered good service.

Mr. JOSEPH CASH seconded the vote, which was unanimously accorded, and acknowledged by the CHAIRMAN.

According to a report of the American Minister at Stockholm, a recently issued Royal Decree prohibits the consumption in Sweden of electricity and gas for signs or for advertisements out of doors. The same Decree also limits the use of gas and electricity in private houses and commercial buildings. In Stockholm there may be consumed only 60 p.ct. of the quantity used during the corresponding period of last year. This amount is furnished at the usual rate. An additional 60 p.ct. may be taken, if necessary, at greatly increased charges.

BARNET DISTRICT GAS AND WATER COMPANY.

Business Shows a Satisfactory Development.

The Half-Yearly Meeting of the Company was held last Wednesday, at the Offices, No. 139, Cannon Street, E.C.—Mr. A. F. PHILLIPS, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said the past half year had been a continuance of the anxiety of the half year which immediately preceded it. There had been the attention necessary to maintain the stock of coal and other material for ensuring the continuance of the supply of gas and water to the Company's district. There had also been trouble in replacing the 83 men out of 160 of the Company's employees called upon for military service. The result of the half year's working under such conditions might be considered satisfactory. While there had been no important extensions of the works and mains, the business of the Company showed a satisfactory development. The sale of gas increased over 14 p.ct. on the corresponding previous half year, and the water-rental over 2½ p.ct. There had been no new building in the district; and only 32 new gas and 15 water services were laid. The small increase in the water-rental was owing to there being no new building supplies. From the statement of the capital account, it would be seen that there was again no addition to the capital expenditure, which was satisfactory in these times, when capital was difficult to obtain. In the revenue account, coal had cost £9696, against £8409 the previous half year, due to the increased cost and 582 more tons having been carbonized. Oil and coke figured at £698, against £252. Some 4½ million c.ft. more of carburetted water gas had been made; and the cost of oil was higher. Repairs of works showed an increase from £2506 in 1916 to £3298 for the past half year, due to expenditure on the carbonizing plant. The expenditure on meters was £540, against £372; but on stoves there was a reduction from £1343 to £1138, less work having been done. The war bonus and allowance to employees had risen from £342 to £679; and this item would continue to increase. The other expenses were much the same as the previous half year. The revenue from gas was £18,644, against £16,565, due to an additional 14 million c.ft. having been sold; the price of the gas having been the same. Products returned £5258, against £4698; the increase being obtained from the higher price realized for coke, as sulphate of ammonia showed a falling off of £221. The result of the half-year's working was a profit of £4033, as compared with £4425 in the previous year. The expenditure on pumping charges in the water revenue account was £3069, against £2705, due to the increased cost of fuel; all other charges remaining much the same, except that, as with the gas undertaking, the war bonus and allowances to dependants of employees on military service had gone up from £342 to £679, and would further greatly increase. The water-rental showed only a slight increase; being £25,067, as compared with £24,396 the previous year, though 51 million gallons more water were supplied. The increased consumption of water might be due to waste during the long frost, and more water being used in the warm weather of May and June. The net profit from the water undertaking was £14,454, against £14,655 for the previous half year. The profit and loss account showed that, after adding the balance from the gas and water accounts to the £23,203 brought forward, and deducting £4354 income-tax, £1529 interest on debentures and temporary loans, and transferring £1000 to the contingency fund, there remained an available balance of £34,992, from which dividends of 9, 8, and £6 6s. p.ct. were recommended, absorbing £11,125, and leaving £23,866 to be carried forward. The works had been provided with a plant for the recovery of the benzol from the gas, and a hot-coke conveyor, which had been charged against the contingency account, the balance of which would stand at £15,119.

THE PRICE OF GAS.

Throughout the half year the staff and the employees had loyally served the Company's interests. The dependants of those serving with the military forces had been properly cared for. The Directors also, realizing the additional cost of living, granted increases in the war bonuses which they considered would meet it. These increases did not, however, satisfy the demands of the Company's employees; and further advances had had to be conceded, with which they should be content. The rises in wages were so serious that it would most probably be necessary to make a further increase in the price of gas to meet them. He might remind the proprietors that there had only been an advance of 2d. per 1000 c.ft. since the war broke out; and the Directors had hoped to avoid any further increase. He had recently visited the gas-works and all the pumping-stations. They were in excellent order, and equal to meeting any demands likely to be made upon them. The results obtained had been most satisfactory—over 13,000 c.ft. of gas and 10¾ cwt. of coke per ton of coal having been sold. The fuel used in pumping the water was only 3¼ tons per million gallons, with a lift varying from 380 to 557 feet head. If in the past the undertaking had been able to maintain its position, the future was full of the greatest anxiety. Labour became ever more difficult, as the needs of the country made demands for more men; and the additional wages paid would have a serious effect on the Company's results. They were employing many women, and excellently they did their work; but there was some work for which they were not suitable. The supply of coal and oil was always a source of anxiety. The Government were ever making increasing demands for benzol and tar, which were vital for the conduct of the war. It was possible that, in order to increase the production, changes might have to be made in the system of carbonizing, the effect of which on the Company's results might not be advantageous; but whatever was necessary to meet the country's requirements, the Company would, so far as they were able, loyally carry out. The benzol-producing plant was working satisfactorily. To enable the Company to carry on this process, an Order under the Calorific Standard Act, to replace the illuminating power standard with a calorific standard, had

been made by the Board of Trade. This gave no benefit to the Company, as works of their size could not make it remunerative. It was adopted from patriotic motives.

The Deputy-Chairman (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion, which was unanimously agreed to without discussion.

On the proposition of the Chairman, seconded by Mr. Alfred Lass, F.C.A., dividends were declared, less income-tax, for the half year, at the rates per annum of 9 p.ct. on the "A" and "C" stocks, 8 p.ct. on the "B" stock, and £6 6s. p.ct. on the "D" gas and water stocks.

The Chairman proposed a hearty vote of thanks to the Secretary (Mr. Drew), the Engineer and Manager (Mr. F. J. Bancroft, M.Inst.C.E.), the members of the staff, and all the Company's employees for the services they had rendered during the past half year. He said they had all been most devoted to the Company's interests, and had endeavoured to obtain the best possible results. Mr. Bancroft especially had had a very anxious time in keeping the works going and getting in the necessary material, as well as in endeavouring to make his men feel satisfied.

Mr. Drew and Mr. Bancroft suitably returned thanks for the vote, which was cordially passed.

Proposed by Mr. F. R. Smith, and seconded by Mr. William Richards, a hearty vote of thanks was accorded to the Chairman and Directors, and this brought the meeting to a close.

INCREASED PRICES AT NOTTINGHAM.

Nottingham was among the last of the large municipal gas-owning authorities to raise its charges; but when a general increase of 12½ p.ct. was made in June, 1915, it was accompanied by the intimation that the trend of events might render a further advance inevitable. In January of this year, there was a limited increase in regard to a class of special customers using gas for power and gassing purposes; but there has been no general addition to the prices since the middle of 1915.

With profits still maintained at a high level, the Committee have been able to withstand further demands upon the bulk of the consumers; but a report presented at a meeting of the Council held yesterday indicated the impossibility of longer delaying a revision of the scale. It was recommended that there should be an advance at the rate of 6d. per 1000 c.ft., to come into operation at the end of the current quarter. The Committee pointed out that, since the advance of 12½ p.ct. was made two years ago, there has been a continuous and steady increase in the cost of coal and all materials connected with gas manufacture, in addition to a considerable rise in wages. The cost having now become so serious, they recommended the Council to authorize an increase in the price charged for all purposes, other than for power and gassing (except for gas supplied through prepayment meters, with respect to which no alteration was for the present suggested). The 12½ p.ct. mentioned will merge in the new increase; and in future 2s. 10d. per 1000 c.ft. will be charged if the consumption be under a million c.ft. per quarter, 2s. 9d. if the consumption is a million and under 4 million c.ft. per quarter, and 2s. 8d. when the consumption is 4 million c.ft. and upwards per quarter. The charge for gas supplied through prepayment meters remains at 3s. 4d. per 1000 c.ft.; and the new scale does not apply to the districts in which special charges for gas are made under statutory powers.

The discussion on the motion for the adoption of the report was adjourned.

LICHFIELD PUBLIC LIGHTING CONTRACT.

The Question of Maintenance.

At a meeting of the Lichfield City Council, the Streets and Highways Committee, to whom a recommendation that the Council should continue to pay the Gas Company's maintenance charge of £218 per annum less 5 p.ct. discount, had been referred back, reported that, after full consideration, they unanimously agreed to adhere to their recommendation. The Gas Company stated in a letter that the charge was made up as follows: One year's interest on the capital value of the lighting plant, £77; maintenance, depreciation, rates, taxes, and painting for twelve months, £141.

Mr. Winterton expressed his surprise at this decision, and said he had a large and influential body of ratepayers behind him. He dare not support the recommendation, as he was convinced they would be surcharged by the Local Government Board. The restriction of lighting was under the Defence of the Realm Regulations; and if the Gas Company considered they had a claim for interest and maintenance, it was against the Defence of the Realm Losses Commission. In his opinion, the Corporation were not responsible for any further charge than the cost of the gas to light lamps which were lighted, *plus* the cost of the maintenance of the standards. This he placed at not more than 3s. each on an average per annum. He opposed the recommendation, not only on commercial grounds, but from the standpoint of the Corporation's duty to the ratepayers. There was no member of the Council who would enter into a contract of this kind if he had to pay the money out of his own pocket; and the Corporation ought not to spend public money where they would not spend their own.

The Sheriff (Mr. J. R. Deacon) moved an amendment that no contract be entered into with the Gas Company.

Six voting in favour and six against, the Mayor gave his casting-vote in favour of the Committee's recommendation.

Mr. W. Morrison said the Gas Company had invested their capital, and were perfectly entitled to interest on it. If the Council did not renew the agreement, they would have to pay increased charges on the next contract, or the general consumers would have to pay. The Company would not be the losers in the long run.

The Deputy-Mayor (Mr. C. T. Wigham) said it was only right that the Council should pay for the maintenance of the plant, so that it was ready for immediate use; and he strongly supported the Committee's recommendation. The charge was the same as had always been paid.

Eventually an amendment that the question be again referred back to the Committee was carried by seven votes to five.

COAL GAS FOR MOTOR VEHICLES.

Some Glasgow Experiments.

A report on some experiments which he has been carrying out in connection with the use of coal gas for motor vehicles has been presented by Mr. Richard Liggett, to the Glasgow Corporation Gas Committee. The lines followed were those indicated in a paper on the subject which Mr. Liggett read last year before the Foremen's Association of the Glasgow Corporation Gas Department [given in the "Journal" for Sept. 26, 1916, p. 620.]

A special gas-controller and a governor or reducing valve invented by him were used for the experiments; and nine cylinders tested up to 250 lbs. per sq. in. were loaned by the North British Railway Company. One cylinder was fitted on each side of the chassis, and one at the rear; giving a total holding capacity of 400 c.ft. of gas at 200 lbs pressure. The remaining six cylinders were coupled together in the yard, for the purpose of forming a quick-charging battery, containing 1785 c.ft. of gas at 250 lbs. pressure. The force-pump used compresses 400 c.ft. of gas in 80 minutes; whereas the battery cylinders will supply the same quantity in four minutes. For the trial runs, a 25 H.P. Halley 2-toner was selected, the unladened weight of which is 3 tons 11 cwt., including 5½ cwt., the weight of the three cylinders and fittings; and the tests were carried out with a measured gallon of petrol as against 400 c.ft. of gas. The results are given in the table as well as those of enriching the gas with petrol by the two following methods, neither of which showed good results:

1.—By blowing the gas at low pressure on to a gallon of petrol in the low-pressure tank (ordinary petrol tank), which is used to allow the gas to expand before being taken up by the engine. By this method, 19 gills of petrol are absorbed.

2.—By the gas blowing through the trap in which a measured gallon of petrol has been placed. By this method, 6 gills of petrol are absorbed. The trap mentioned is a 5-ft. length of 4 in. steam-pipe, which is placed between the pumps and the gas-cylinders of the car to trap any oil or water which may come from the pumps.

Flexible Gasholders.

A comparison was secured between gas contained in a flexible holder and that in a steel holder. The test was made with a load of 2 tons of lead. The Gas Department motor was a 25 H.P. Halley gross weight 5 tons 11 cwt., including the steel holders, containing 400 c.ft. of gas at a pressure of 200 lbs. per sq. in. The consumption of gas for the 7-mile run was 235 c.ft., or 33·57 c.ft. per mile. The time taken was 40 minutes. The other motor was a 30 H.P. Halley gross weight 5 tons, including the flexible holder containing 330 c.ft. of gas. The motor consumed all the gas in covering 6·3 miles; the consumption being 52·38 c.ft. per mile. The time taken was 36 minutes. This test showed 18·81 c.ft. per mile in favour of compressed gas. Mr. Liggett remarks that, as a war-time or emergency expedient, the flexible holder in outlying districts, where the leakage of gas from the holder has plenty of space, may be very good; but in the city area, where many of the garages are low in the roof, and very often close to or under dwelling-houses, the smell from these holders would be somewhat objectionable, and very dangerous. Their usefulness is also limited to roofed vehicles. For lorry work they are not suitable.

Steel Gasholders.

The subject of steel gasholders, says Mr. Liggett, should not be approached by the gas industry as a war-time or emergency expedient, but as a further outlet for the use of coal gas and a serious competitor to electricity or petrol in the commercial life of the city. Compressed gas in steel or rigid holders is the practical solution of the problem of carrying a supply of gas for power purposes on motor vehicles. There were four principal objections to its use:

1.—*Compression.* This is the most serious item of expense, but could easily be overcome by the battery system referred to above. The gas consumed in compressing 400 c.ft. of gas, in the case under review, was about 12 c.ft., costing under a halfpenny. The railway companies had practised this method for many years by placing large cylinders of compressed gas on trucks and sending them to various stations to charge the gasholders which were fitted to the carriages.

2.—*Gas Controller.* On the motor vehicles which he had seen at several places, the gas was drawn from the flexible holder and supplied to the engine by an ordinary gas connection fitted to the induction pipe at or near the governor valve; the air supply being drawn through the carburettor in the usual way. This method was certainly simple, as gas or petrol could be used as required; but it was a great waster of gas, and did not allow the best results to be obtained from either gas or petrol. To get the best results from gas a special controller or carburettor for gas only should be used to supply the engine with a proper explosive mixture. The special controller which was used on the gas-driven motor of the Department gave these results, combining simplicity with utility; and by the movement of a pin, gas or petrol could be used without stopping the engine. The controller was made in eight parts—the four principal being the inner sleeve, outer sleeve, air cuff, and gas cuff—and was fitted to the engine by a special connection or duct inserted between the flanges of the induction pipe and the petrol carburettor.

3.—*Governor or Reducing Valve.* This might be an objection, but it was an indispensable fitting for compressed gas, and on it the driver depended to get a regular supply of gas at low pressure—the lowest pressure being necessary for the efficient working of the engine to drain the holders of the last foot of gas. The governor used was

Table of Results *of the Trials run between 400 c ft. of gas compressed to 200 lbs. per sq. inch, and a measured gallon of petrol; outward and inward trials being run at various loads. The gross weight of the vehicle is shown. Route between Glasgow and the Village of Cumbernauld. Gas costing 2s. 8d. per 1000 c.ft. (New Glasgow Price). Petrol costing 2s. 2d. per gallon.*

July, 1917.	Weight. Tons.	Cwt.	Distance (Miles). Gas.	Petrol.	Time (Minutes). Gas.	Petrol.	Per Mile. Feet. Gas.	Gills. Petrol.	Cost per Mile. Gas.	Petrol.
Gas—out	5	11	11 6	..	63	..	34·482	..	1·103d.	..
,, in.	5	11	13·6	..	65	..	29·411	..	·941d.	..
Petrol—out	5	11	..	9·3	..	53	..	3·440	..	2·795d.
,, in	5	11	..	12·0	..	70	..	2·366	..	2·166d.
Gas—out	5	0	11·1	..	65	..	36·036	..	1·153d.	..
,, in	5	0	14·2	..	63	..	28·169	..	·901d.	..
Petrol—out	5	0	..	10·0	..	47	..	3·200	..	2·500d.
,, in	5	0	..	12·6	..	65	..	2·539	..	2·062d.
Gas—out	4	10	12·4	..	63	..	32·258	..	1·032d.	..
,, in.	4	10	15·6	..	74	..	25·641	..	·820d.	..
Petrol—out	4	10	..	10·3	..	75	..	3·106	..	2·523d.
,, in.	4	10	..	12·7	..	63	..	2·519	..	2·046d.
Gas—out	4	0	13·3	..	58	..	30·075	..	·962d.	..
,, in	4	0	15·9	..	69	..	25·157	..	·805d.	..
Petrol—out	4	0	..	11·7	..	50	..	2·735	..	2·222d.
,, in	4	0	..	12·5	..	57	..	2·540	..	2·080d.
Gas—out	3	11	13·5	..	55	..	29·629	..	·948d.	..
,, in.	3	11	16·0	..	67	..	25·000	..	·800d.	..
Petrol—out	3	11	..	11·7	..	49	..	2·735	..	2·222d.
,, in	3	11	..	13·1	..	59	..	2·442	..	1·984d.
Gas—Total	22	12	137·2	..	642	..	29·154	..	·932d.	..
Petrol—Total	22	12	..	115·9	..	588	..	2·781	..	2·243d.

Note.—The unladened weight of vehicle is 3 tons 11 cwt. No hills were coasted, but all were driven down at a regular speed on brakes. No adjustments were made during trials.

Table of Results *by Enriching Gas with Petrol. Out Runs Only.*

	Weight. Tons.	Cwt.	Distance Miles.	Time Minutes.	Per Mile. Feet Gas.	Gills Petrol.	Cost per Mile.
1. Blowing gas on to petrol in pressure tank	5	11	14 6	70	27,390	19	1·933d.
2. Compressing petrol with gas	5	11	12·0	67	33,333	6	1·472d.

one he had specially designed for this particular work; and it had admirably fulfilled the conditions required of it. The principal parts were the body piece, high pressure tube, low pressure tube, valve, diaphragm, balance, and socket.

4.—*Wear on Tyres due to Extra Weight Carried.* This objection would not prove very serious, when the great saving in fuel was taken into account.

In conclusion, after being satisfied that compressed coal gas for motor vehicles is a practical thing, and a good proposition for a further outlet for the sale of gas, Mr. Liggett suggests:

I.—That the Department prepare all their existing motors for gas.

II.—That two experimental cylinders, 10 in. × 4 in., capable of withstanding 1000 lbs. pressure per square inch, be obtained—one to be mounted in place of the present battery to supply the Department motors, and one to be mounted on a chassis to supply any consumer who may wish to give the system a trial. The system could afterwards be gradually extended.

III.—That pumps or compressors be got to fill these cylinders with gas up to 1000 lbs. pressure per square inch in 60 minutes.

He is convinced that if the above method is tried, good results will be obtained.

THE GAS CONTROVERSY AT CHICAGO.

Terms of Final Settlement.

The City Council of Chicago have agreed with the People's Gas Light and Coke Company as to rates and conditions of gas supply. The agreement has been arrived at after prolonged negotiations, in which the Company were represented by engineers (Messrs. Woolfolk and Chenery), and not by lawyers; and the expert acting on behalf of the city was Prof. Bemis. The contract now accepted by both parties is for one year only, but may be extended to five years by mutual consent. The Company recognize the right of the city to regulate price and quality, subject to no changes within the year, the right of contest, and the regulations of the Illinois Public Utilities Commission.

Hitherto the supply has comprised water gas manufactured by the Company, supplemented by coke-oven and natural gas purchased in bulk, to the extent of one-fourth of the total of 21,000 million c.ft. per annum. The 700,000 consumers are supplied through about 3000 miles of mains, with gas of 22-candle power and 660 B.Th.U. heating value, at a price of 80 c. per 1000 c.ft. The high quality standard necessitated the use of 8,000,000 gallons of oil per annum; and as oil was greatly advanced in price, the chief question, on the part of the Company, was the avoidance of the heavy oil bill. Matters were complicated by the fact that the city, advised by Prof. Bemis, had in 1911 fixed the price at 68 c., and talked about a refund of $10,000,000 on the strength of his recommendation.

The new calorific standard is a monthly average of 565 B.Th.U., with a minimum of 540 B.Th.U. as an average of two consecutive days; and there is to be a gradual reduction of illuminating power. For 60 days after the acceptance of the ordinance, it is not to be less than 16 candles; during the next 120 days, it must not fall below 12; and then it is to be within the limits of 9 to 11 for a whole year. The object of spreading this clause over 18 months is the protection of the flat-flame user, and to afford time for education on the advantage of substituting incandescent burners. The final stipulation indicates an attempt to secure uniformity of composition. The Company are to make four free adjustments of all gas appliances in the city within the first year, and two in each following year; and, within 60 days after the ordinance takes effect, they are to make a house-to-house canvass, and offer to all consumers entirely dependent upon, and having no other means of lighting than, flat-flame burners, two junior mantle lights free of charge, and to sell mantles at half cost to all classes of consumers. As compared with the flat flame, the junior burner used half the gas and gave more than twice as much light, and, after all reasonable allowance for maintenance, afforded a large saving.

The price schedule is based upon the quantity of gas used, together with a variable initial charge for the first 350 c.ft. used per month, or less, which also constitutes a minimum charge. After satisfying the first charge, which ranges from 30 c. for a 10-light meter, by gradual advance according to size up to $2 for a 400-light meter, less than 10,000 c.ft. will be charged at 70 c. per 1000 c.ft.; additional consumption up to 50,000, at 65 c.; and any further excess, at 40 c. The rental ledgers for recording so many different conditions will be somewhat elaborate in character. The scheme is not entirely satisfactory to either side, but is the nearest approach that seemed practicable.

The Company undertake to build a new coke-oven plant, and within three years to supply not less than 8000 million c.ft. from it. This will mean a gas that will conform to the new standards, and cost 10 c. per 1000 c.ft.—one-third of the present cost of making water gas.

Profit sharing as between the City and the Company—the employees being left out in the cold—is a condition, but only applies to excess profits. From the total income from all sources is to be deducted the normal working expenses, depreciation, reserves, taxes, 6 p.ct. on all new securities represented by property, $4,000,000 to pay interest on bonds, and 4·2 p.ct. on the present stock; of the remainder, $500,000 is to be divided between the City and the Company in the proportion of 25 : 75; and the balance is to be shared equally. The effect is that both parties share alike in all profits exceeding a 5·2 p.ct. dividend.

Camborne Gas Company.—Presiding at the annual meeting of the Company, Mr. C. Bryant said the cost of coal had increased over 50 p.ct.; but the price of gas to the consumers was only 10 p.ct. more than before the war. The Directors were anxious not to advance the price further; but, if necessary, the consumers must be prepared to bear their share of the burden. In spite of the absence of public lighting, and the restrictions in other directions, the consumption had decreased by only 2,000,000 c.ft. He hoped satisfactory arrangements would be made for at least a partial lighting of the town during the coming winter. A dividend of 4 p.ct. was declared.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 3.

The tar products prices are steady, and so far as products under Government control are concerned, there cannot be any fluctuation in values. Pitch continues in demand, but the difficulty is to find manufacturers who desire to sell further quantities at present. For export the quotation stands nominally at 45s. net f.o.b., makers' works.

Other prices are solvent naphtha 90-160 about 2s. 3d. net and naked *ex* works, anthracene 40°-50° 6d. net per unit casks free and delivered.

A fair amount of business in sulphate of ammonia is being done for home agriculture on the basis of the official prices according to time of delivery.

Tar Products in the Provinces.

Sept. 3.

Markets for tar products remain about the same. Pitch is still very firm in London and high prices are being paid.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., London, 11½d., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¾d. to 7¼d. Solvent naphtha, naked, London, 2s., North, 1s. 11d. to 2s. Heavy naphtha, London, 1s. 3d. to 1s. 5d., North, 1s. 1d. to 1s. 2d. Creosote, in bulk, London, 3⅞d. to 4⅛d., North, 3¼d to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of July, was 27s. 7d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

These products generally remain quiet and firm. The pitch position continues to improve, so far as export business is concerned; and up to 48s. per ton has been paid in London. Provincial producers find a difficulty in getting at the export trade, owing, in the first place, to the expenses of carrying northern pitch to London; secondly, to the probability that the railway companies would not be allowed to carry any large quantities; and, thirdly, to the almost impossibility of obtaining shipping facilities at provincial ports, on account of general tonnage shortage. Consequently, provincial prices do not respond as readily as London. Nevertheless, the shipping position encourages holders, who are not over-anxious to sell, and are able to refuse low offers. Continental demand is still brisk, and shipments are to be continued throughout the remainder of the summer. A little united action on the part of provincial producers would probably secure for them a portion of this trade. Benzol and toluol remain unchanged; and solvent naphtha continues a strong market. Supplies of the last-named are somewhat scarce; but quotations are still on last week's basis, although sellers are talking about getting more money in the near future. Crude naphtha is firm. On and after Oct. 1, dealing in any crude benzol, crude naphtha, or light oils containing recoverable quantities of benzol or toluol are prohibited, except under licence; and all persons engaged in the trade are required to make such returns regarding their businesses as may from time to time be asked for by the Ministry of Munitions. The effect of this order upon quotations is too early to anticipate; but it will certainly not fail to prove a handicap to business, as a similar order has done in the case of naphthalenes. Cresylic acid is no worse; the general quotation being 2s. 4d. per gallon, although Glasgow quotes 2s. Aniline oil is a shade lower. Carbolic acid (crude) remains at the fixed price; and crystals are very rarely mentioned, as the Government is taking practically the whole production. Naphthalenes, both refined and crude, are steady, and inclined to be in short supply. The range of quotations is as follows:

Aniline Oil (pure): 1s. 2d. per gallon.

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d., North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. to 20s. f.a.s., Clyde 20s. per ton. New Season: Provinces 25s.

Solvent Naphtha: Naked London 90-190 % 1s. 7d. to 1s. 9d.; North 1s. 4d. to 1s. 6d. per gallon; 90-160 % naked London 2s. 3d. to 2s. 4d.; North 1s. 11d. to 2s. 2d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

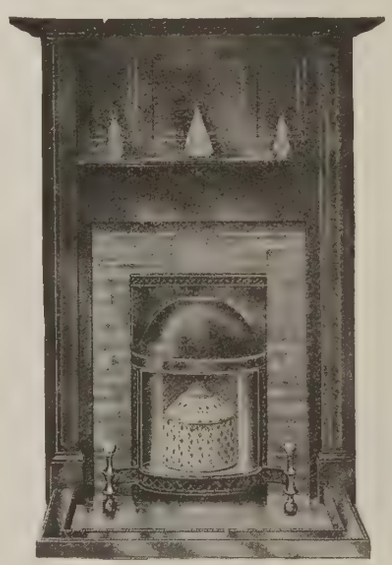
Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1⅜d. to 2¼d.

Richmond's "R.H.D." Gasfire

(Radiant Heat Distributor).



1. Perfect distribution of heat owing to convex fire front.
2. Perfect ventilation of room by numerous air ports.
3. Complete silence in burning and high radiant efficiency.
4. Handsome and pleasing design, attracting attention wherever exhibited.

"The 'R.H.D.' Fire, fitted in our Model Room, has a splendid appearance; we sold it before it had been a day in position."

—Letter from a large Northern Gas Undertaking.

THE RICHMOND GAS STOVE & METER CO., Ltd.,

Academy Street, Warrington. 132, Queen Victoria Street, E.C. 4.

Cresylic Acid: 95 %, 2s. 4d.; 97-99 %, 2s. 6d.-2s. 7d., *ex* works London and f.o.b. other parts.

Grease Oils 18° Tw. (naked), £6 per ton, f.o.r. makers' works.

In America, an easy market prevails. Stocks are accumulating; while buyers hold off. The following U.S. quotations to hand by last mail may be of interest: Benzol, 2s. 3d.; toluol, 7s. per gallon; aniline oil, 1s. 3d. per lb.; pitch, from 40s. to 100s. per ton according to grade; anthracene, 80 p.ct., 5d. per lb.

Sulphate of Ammonia.

There is little fresh news coming to hand regarding sulphate. Very few shipping licences are being issued; and the exports for last month will show very small quantities when the trade returns are forthcoming in a few days' time. The home demand at the present time is easily accounting for home supplies. Production has, of course, greatly increased of late, and is still increasing; but, fortunately, the British farmer is gradually learning the many advantages of sulphate as a fertilizer, and is buying fairly freely. His trade is, without doubt, one to be cultivated and developed, as only by this means will the manufacturer be able to face the loss after the war of a large portion of his export trade, which will be the result of the present restrictions. Concerted publicity and educational propaganda—for which there has previously been entered a plea in these reports—would go a long way towards producing the desired results after the war. At present business is decidedly good; the low quotation till the end of this month attracting many orders. Next month the price will be £15 17s. 6d. to £6 per ton; so that activity should continue and possibly increase as the month progresses. In America, apart from contract business, sulphate is practically off the market; the only offers being confined to a few tons of surplus material held by consumers who satisfied their probable requirements earlier in the year. Never before has there been such a scarcity; and prices have reached the equivalent of £29 per ton —an almost unheard-of figure. This is, however, merely a passing phase, as in a few months America is likely to have an exportable balance, which, should Japan not have made good by home production her loss of imports from this country, will be readily saleable there.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 17s. 6d. to £6 January-May, £16 7s. 6d.—all delivered; 10s. less at makers' works.

Export (under licence only): London, Liverpool, Leith, and Hull, £23 10s. to £24 f.o.b.

At Keighley last Friday, the use of high-pressure gas for motor lorries commenced; a wagon receiving a charge of 450 c.ft. It was calculated that this supply would carry a 25 H.P. vehicle weighing 2 tons a distance of 20 miles. As to relative costs, it is assumed that 250 c.ft. of gas at 2s. 4d. per 1000 c.ft. equals in driving power a gallon of petrol at 3s. 8d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is rather firmer for prompt delivery; but for forward, the tone of the market is somewhat uncertain. The home demand is generally good, but the export trade is restricted by the insufficient arrivals of steamers. In the steam coal branch, best kinds are firm. Northumbrians are 30s. per ton f.o.b.; second-class steams are 25s. 6d. per ton; and steam smalls are plentiful at from 18s. 6d. to 20s. per ton. Work is a little brisker at the collieries; but idle time is still frequent in some parts. In the gas coal trade, the steady increase in consumption continues; and there is now a desire to stock more freely. For best Durham gas coals, 25s. per ton is now the f.o.b. quotation; second-class gas coals are 23s. 6d. per ton; and "Wear specials" are firm at 28s. to 30s. per ton f.o.b. There is some scarcity of the best gas coals; but secondary kinds are fairly abundant. Freights on gas coals to London are a little higher—about 16s. being now the current rate; and to the neutral ports they are relatively higher. The large consumption of coking coal seems to be stiffening Durham coal prices generally. The production of gas coke is increasing; but the output is well taken up. Good gas coke is 29s. to 31s. per ton f.o.b. A demand for France seems heavier, with high freights.

Purifier Destroyed at Salisbury.—An oxide of iron purifying box, 25 ft. square, at the Salisbury Gas-Works was destroyed by an explosion on Monday of last week, when it had been partly emptied. Fortunately, no workmen were engaged in the building at the time. The resulting fire was promptly dealt with by members of the staff, under the direction of Mr. W. Fielden (the Engineer and Manager); but the services of the volunteer fire brigade were also requisitioned. Effective measures were adopted to prevent any spread of the fire to three other boxes through which gas was passing at the time, and also to one of the smaller gasholders in the near vicinity which was deflated. The cause of the explosion remains a mystery.

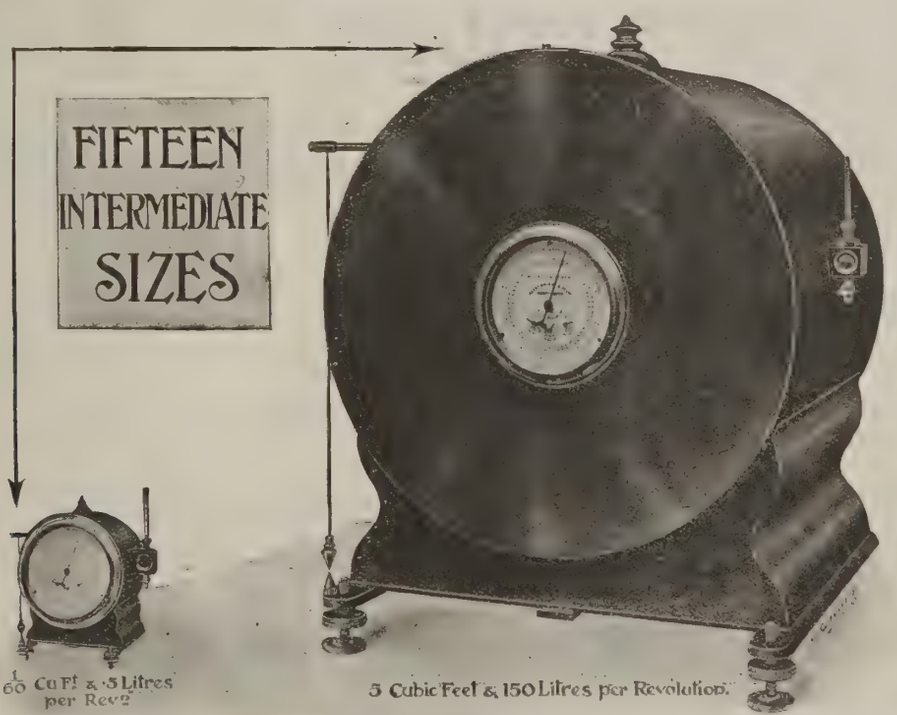
NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

Laboratory Meters



ALEXANDER WRIGHT & CO., LTD.,

WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Northwich Gas Company.

The half-yearly meeting of the Company was held on the 27th ult. Mr. C. T. Eachus (the Chairman) presided, and, in presenting the statement of accounts for the half year ended June 30, complimented the shareholders on the good results attained, especially having regard to the very high cost of raw materials and increases in wages. He said that, after careful consideration, the Directors had decided to recommend that an interim dividend be declared at the rate of 4 p.ct. per annum on the preference shares (free of income-tax), and 4 p.ct. per annum on the ordinary stock (less income-tax). The report was adopted, and the dividend agreed to.

Chester United Gas Company.

Moving the adoption of the report and statement of accounts at the recent meeting of the Company, the Chairman (Alderman J. M. Frost) said the general result of the six months' operations had been satisfactory, and had resulted in a balance of gross profit of £6055, which was nearly £150 in excess of the profit earned in the corresponding period of last year. After providing for payment of £569 interest on debenture stock and £1050 dividend on preference stock, and payment of interest on temporary loans, there remained a net balance of £4317. The dividend recommended would absorb £3929, leaving a balance of £388 to carry forward, subject to a small balance of income-tax still to be paid. Considering the very trying times and the excessive rise in the price of all materials, they should be highly pleased with these results, more particularly so as they were obtained with an increase in the price of gas of only 5d. per 1000 c.ft., as compared with pre-war prices. Coals had cost nearly £1600 more. This was attributable to an increased quantity of 1100 tons being used, and a small rise in the price, and also in the cost of carting. The cost of works repairs had been rather heavier; but this was due to increased cost of materials. The manufacturing plant had been thoroughly overhauled, and was in very good working order, under the supervision of the new Engineer (Mr. J. H. Noble), who had proved himself to be thoroughly efficient and capable. The benzol recovery process had been in operation since the beginning of March, and had yielded results satisfactory to the Ministry of Munitions. It afforded a reasonable profit; and the Directors hoped that they would have recouped the cost within four or five years. Now that they had had experience with the working of the plant, they found no difficulty in supplying gas up to and above the standard of 500 B.Th.U., fixed by the Board of Trade. The report was adopted, and a dividend of 2½ p.ct. for the half year was declared.

At a meeting of the Inverness Gas Committee, it was stated that it was necessary to increase the cost of gas from Nov. 15 by 10d. per 1000 c.ft. The Provost thought an increase of 6d. would be sufficient; but the decision for the higher rate was carried.

Condemned Gas Mantles.

At the Mansion House Police Court, last Thursday, before the Lord Mayor, Adolf Knopf, trading under the style of the Wholesale Guarantee Incandescent Supply Stores, Waterloo Road, S.E., was summoned to show cause why three cases of incandescent gas mantles, imported in 1915, should not be condemned. The proceedings had been adjourned to enable the defendant to produce evidence from Holland to show that the goods were not of enemy origin. It was now stated that every possible endeavour had been made to secure the attendance of the necessary witnesses; but they were afraid to take the risk of the voyage. It was suggested on behalf of the defendant that the matter should stand over till the end of the war. For the Customs Authorities, Mr. Hubbard said the goods were imported in December, 1915, and were, in the first instance, seized under the Merchandise Marks Act. An examination by experts proved conclusively that the mantles were of German manufacture. The defendant, a naturalized Austrian, did not claim ownership. The loss of the goods would fall on the agent in Holland. The Lord Mayor made the order asked for, with £5 5s. costs.

Johnstone Corporation Gas Accounts.

Mr. James Dickson, the Engineer and Manager, has presented to the Corporation of Johnstone his report on the working of the gas undertaking for the year ended May 15. In it he says that all difficulties have been overcome in a satisfactory manner, due in large measure to improved methods and the ready co-operation of workers of all grades. The quantity of gas sold was 92,829,400 c.ft., as compared with 92,841,000 c.ft. in the previous year—a very small decrease, having regard to the lighting restrictions and the operation of the Summer Time Act. The proportion of gas unaccounted for was 6·25 p.ct. of the make. The income was £21,376, or £2300 more; and the expenditure, £15,834, as compared with £15,073. There is thus a credit balance of £5541, as against £4002. The working-up of tar into its first and second distillates, and selling the refined tar for road making, has turned out a most excellent scheme on the first full year's working. The net income from tar is £1715. Present distillers' prices for crude tar approximate 11s. 6d. per 100 gallons; and by selling the whole year's output of tar on the old lines, an income of £765 would have been secured. The net gain is thus £950, which, added to the results of the part of last year in which the plant was in operation, already wipes out fully three-fourths of the entire capital outlay. The prospects for the current year are favourable, considering all circumstances. Coal has been bought at 19s. 2d. per ton, or 7d. less than last year's contract price; and carbonizing results show still further improvement. The gas sales meantime promise a large increase on that of the year just ended. Refined tar and creosote prices are considerably better than at this time last year; and benzol remains firm. It has been decided, in view of the good working results, and the prospects of the current year, to continue the price of gas at 2s. 10d. per 1000 c.ft. (2s. 9d. to all consumers using 100,000 c.ft. per annum per meter).

BRADDOCK'S RETORT-HOUSE GOVERNORS

HAVE PROVED TO BE

SECOND TO NONE.

Many repeat orders have been received.

Braddock's New Patent Retort-House Governor is a further improvement and is especially desirable for use with Vertical Retorts.

No. 310.
Braddock's New Patent Enclosed Retort-House Governor.
Latest Type.

Further Particulars upon Application.

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Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1.

Telegrams: "METRIQUE, LAMB LONDON." Telephone No. 2412 HOP.

Eastbourne Gas Company's Results.

It was stated at the meeting of the Company, over which Mr. J. C. Towner presided, that, despite the enhanced charges, the half-year's accounts showed increased sales of gas to the extent of 12½ million c.ft., or 5 p.ct., as compared with the same period of the previous year. There had been a growth of 99 in the number of consumers, who now totalled 11,643. Among the anxieties had been the labour question. The military needs had had to come first; and the Works Manager (Mr. W. H. Hammond) had found the greatest difficulty in handling so many thousands of tons of coal and materials at the works. It was to be expected, too, that the increased cost of living would express itself in the wages account. Applications from the men had been most carefully weighed; and increases had been granted by way of enhanced wages, and also war bonuses. The Directors believed that a contented employee was the best worker, and had honestly endeavoured to deal fairly with all. The labour bill had been heavy; but the cost of coal and gas oil, with all other materials, had been appalling. Sea freights had been the principal cause. The Company had used 21,739 tons of coal, at an increased cost per ton of 5s. 8d., as compared with a year ago. The gas oil used had increased in cost from 2·48d. to 8·38d. per gallon. These two items amounted to an additional expenditure for the half year of £8857. In face of these figures, only an increase in the charges for gas could meet the situation—a course which had been followed with the greatest regret. The revenue account showed a profit for the six months of £7129; and a sum of £751 had been transferred from the reserve fund to the profit and loss account. Dividends were declared for the half year at the rate of £6 8s. 9d. p.ct. per annum on the "A" stock, £4 18s. 9d. p.ct. per annum on the "B" stock, and 5 p.ct. on the preference stock. Replying to a vote of thanks to the staff and workmen, the Secretary (Mr. J. S. Garrard) referred to the fact that so many of the men are co-partners in the concern, through the scheme launched three years ago.

Consumption of Gas at Bishop's Stortford.—It was stated at the meeting last week of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company that for the past half year, as compared with the corresponding period of last year, the sale of gas showed a reduction of 1,032,600 c.ft., or 1·78 p.ct.; but as a result of the advance in price made at the beginning of the half year, the gas-rental had increased by £560. The cost of coal and oil carbonized had risen by the large sum of £1234, owing to the increased charges the Company had had to pay. This further enhanced cost of producing gas represented a serious addition to the expenditure on revenue account, which the improvement in the receipts was insufficient to meet. After charging interest, a balance of profit of £2715 is placed to the credit of the profit and loss account. An amount of £3027 is available for distribution. Dividends were declared at the statutory rates, leaving £99 to the credit of the profit and loss account.

Gloucester Gas Company.—The report adopted at the half-yearly meeting of the Company (over which Sir Richard V. Vassar-Smith, Bart., presided) stated that there had been a good increase in the sale of gas; and the revenue from residuals was also larger. A dividend for the six months was declared at the rate of 5 p.ct. per annum, less income-tax, upon the consolidated stock. The Chairman referred to the fact that the Secretary (Mr. W. E. Vinson, F.I.C.) had passed fifty years in the service of the Company; and he complimented Mr. Vinson on this fact.

Loss on the Sidmouth Gas Undertaking.—It was reported at a meeting of the Sidmouth Urban District Council on Friday that the Gas Committee had asked the Finance Committee to provide for a contribution of £500 to the gas undertaking during the ensuing half year. The Chairman (Mr. Halse) said this was the second application of the kind by the Gas Committee. Last year was the worst the gas undertaking had experienced. He did not think the loss would be anything like so bad this year, because they had paid off the last of the short loans, and the consumption had increased in the past two months. During the four years that the Council had owned the works, they had repaid loans to the amount of £4369. They were debarred from increasing the price of gas beyond 4s. 6d. per 1000 c.ft., which was only 6d. more than the late Gas Company charged under much more favourable circumstances. It was a question whether they ought not to have gone in for a Provisional Order giving the Council power to increase the price. He hoped, however, the undertaking would soon be on a more sound financial basis. Other members expressed confidence in the opinion that the gas-works would be an ultimate source of profit to the ratepayers.

Brighton and Hove General Gas Company.—An increase of nearly 12 p.ct. in the sales of gas during the past half year will be reported at the meeting of the Company next Friday. The expenditure upon coal, oil, &c., has risen from £61,801 to £107,367, an increase of £45,566. Approximately 90 p.ct. of this addition to the cost of manufacture is due to the increase in the charges the Company have been called upon to pay for freight. Carbonizing wages, war allowances to employees to meet the extra cost of food, &c., and maintenance allowances to dependants of employees serving with the forces together show the large increase of £3220. To meet in some degree these abnormal charges, the Directors have been compelled to raise the price of gas 4d. per 1000 c.ft. as from July 1. By the terms of the sliding-scale, the rates of the dividends payable for the half year ending Dec. 31 next, will be further reduced by 1 p.ct. per annum—on the original ordinary stock from 10 to 9 p.ct., and on the "A" ordinary stock from 7 to 6 p.ct. per annum. The profits for the half year amount to £18,977, to which is added £38,727 brought forward, giving a total of £57,704. A sum of £52,788 is available; and the Directors recommend the declaration of dividends at the statutory rates. This appropriation will require £20,984, and leave a balance of £31,803 to be carried to the credit of the profit and loss account for the current half year.

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Intensive lamp Dustproof Bunsen Burner lamp for dusty position.

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No. 8001 Lamp.

Separate Taps to each Burner.

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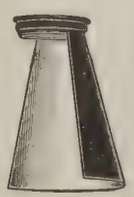
G. 3.

E. 1.

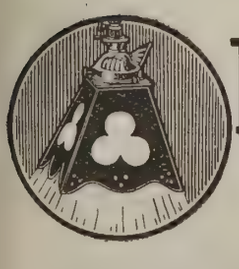
G. 6.

E. 2.



G. 4.

M. S.



Podmore's Protector

G. 7.

G. 5.

K Burners, K Mantles, Glass, etc., etc.

RENEWALS for ALL Lucas Lamp Parts.

Shipley Gas Charges.—As a result of the recent allegations in public that the Shipley gas charges have been unduly and inexplicably heavy, the Gas Committee have been making inquiries, and have satisfied themselves that the records of the meters have been correctly taken and the accounts rendered in accordance with the register. In some cases, the consumption seemed to be exceptionally heavy, and special inquiries would be necessary. The Clerk has been instructed to prepare for submission to the next meeting a report as to these cases.

Manchester Shopkeepers Want More Gas.—The Manchester and District Retail Traders' Association are urging upon the Gas Committee the desirability of their having an extra hour's consumption during the winter months for shop-window illumination; and at a recent meeting of the Gas Committee, it was resolved that the Chief Constable be notified that the Committee were desirous of considering the question of street lighting next winter, and would be glad to have his views having regard to the results of the visits to various towns some time ago. At present, however, the Committee state that they hold out no hope of any improvement in either respect. Considering the number of motor-car fatalities which occurred in Manchester last winter owing to the too-darkened thoroughfares, a modification of the lighting arrangements certainly appears desirable.

Barnsley Gas Company.—The Chairman (Mr. E. G. Lancaster), moving the adoption of the report and balance-sheet at the annual meeting of the Barnsley Gas Company, said that the Directors were again able to place before the shareholders a satisfactory balance-sheet. The profit had amounted to £7342, compared with £7494 for the previous year. Their sales of gas were practically stationary; and this was not an unfavourable result, in view of the restricted hours for lighting. A revolution had taken place in regard to the hours of consumption of gas. Formerly the biggest consumption was at night, up to 11 and 12 o'clock; but now the heaviest draw came on between 12 noon and 2.30 p.m. An aspect not quite so pleasing was the necessity for repairs. They were in a colliery district, where the ground was always more or less on the move, and constant breakages in the mains and services occurred. Their leakage had been between 11 and 12 p.ct., instead of a normal rate of 5 to 6 p.ct.; and if they could save this 5 p.ct., it would be nearly all clear profit. They could, unlike many other gas companies, take credit for not having increased the price of gas. The report and balance-sheet were adopted; and it was agreed to increase the allowances to the Directors by £150, and to pay a bonus of 10 p.ct. on the salaries and wages of the staff.

Damage which is roughly estimated at £5000 was done to the premises of the Parkland Manufacturing Company, Bingley, by a fire which broke out on Friday morning. The office portion was entirely gutted; and as these and other parts of the works were electrically lighted, the fusing of an electrical connection is thought to have been the cause.

The Scottish Motor Traction Company, of Edinburgh, who have at present several of their buses equipped with flexible gas-containers, are to extend this method of obtaining power to other buses on routes running 22 miles out and home. They have departed from the usual plan of passing the gas through the carburettor, and have made the connection to the engine through the induction-pipe; but this makes no difference to the fuel control. A new and improved gas-container is on the market, made by a British firm of rubber manufacturers. These are gas, air, and water tight, and are quickly and easily fitted.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 29.]

Nos. 11,896—12,236.

ALDRIDGE, J. G. W.—"Charging-machines for gas-retorts, &c." No. 12,190.

BOWDEN WIRE, LTD.—"Bunsen burners." No. 12,178.

BURNS, H. A.—"Separating suspended particles from gaseous bodies." No. 12,055.

CALLENDER, L.—"Using compressed or condensed gas to drive internal-combustion engines." No. 11,957.

CLARK, F. W.—"Gas manufacture." No. 12,042.

COLLINS, F. E.—"Utilization of compressed gas as fuel for engines, &c." No. 12,161.

COMPAGNIE DES FORGES D'AUDINCOURT ET DEPENDANCES.—"Calorimetric meters." Nos. 12,102, 12,103.

COX, D. S.—"Trailer gas-fuel container for motor-vehicles." No. 11,961.

DAVIES, P.—See Bowden Wire. No. 12,178.

DEBAISIEUX, E. L.—"Gas stoves or radiators, &c." No. 11,916.

GIBBONS BROS.—See Clark. No. 12,042.

GUILLEMIN, A.—See Compagnie des Forges. Nos. 12,102, 12,103.

HARGER, J.—"Utilization and combustion of fuel." No. 12,044.

HELPS, G.—"Gas manufacture, &c." No. 12,043.

HELPS, G.—See Harger. No. 12,044.

HENNESSY, J. J.—"Stopping from outside punctured holes in gas, water, &c., vessels." No. 12,027.

JONES, S.—"Vertical retorts." No. 12,134.

LEWIS, W. I. G.—"Gas-heaters." No. 12,135.

MACDONALD, J. D.—See Jones. No. 12,134.

MCLELLAN, T.—"Stopping holes in pipes, &c." No. 11,984.

OTTINO, G. P.—"Storing coal gas, &c., for motor-vehicles." No. 12,151.

RAMUZ, O.—"Mechanical high-pressure compressors." No. 12,171.

SHERWOOD, F.—"Gas cooking-stoves." No. 12,081.

SIMPSON, J. E.—"Incandescent gas-mantles." No. 11,962.

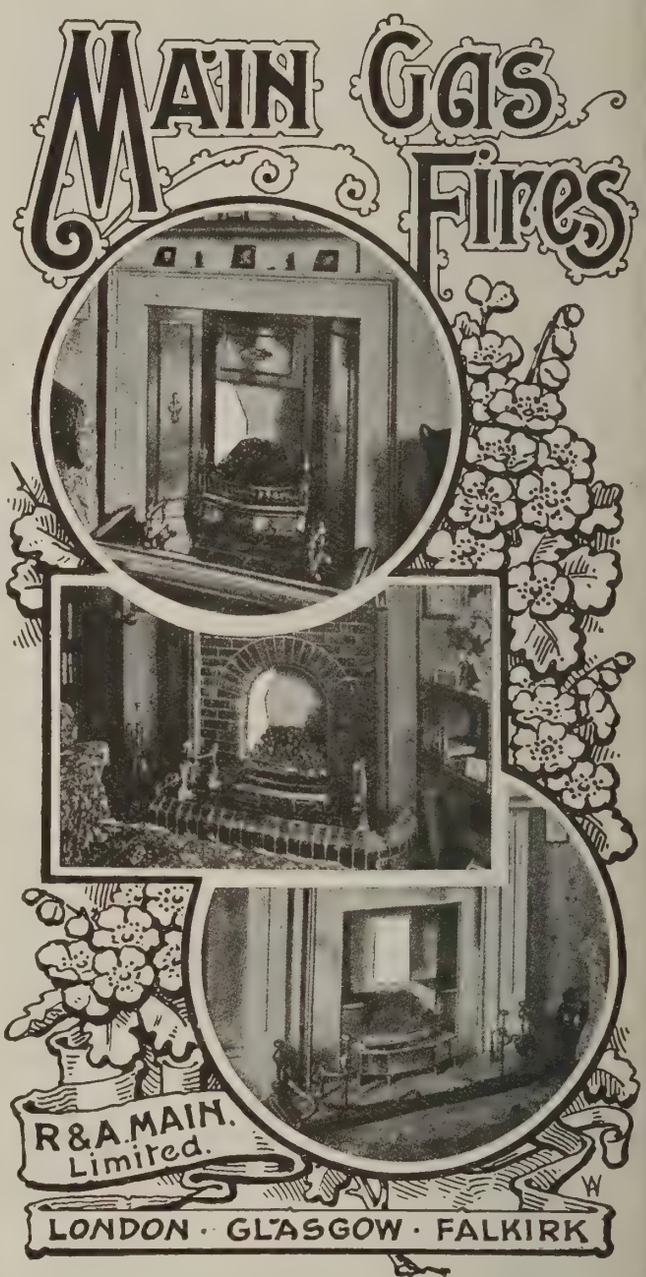
SOUTHEY, A. W.—"Gasifying liquid hydrocarbons." No. 12,108.

SVENSKA AKTIEBOLAGET GASACCUMULATOR.—"Automatically exchanging incandescent bodies in an incandescent gas-light arrangement." No. 12,073.

TOWNSEND, W. W.—"Intermittent vertical retorts." No. 12,089.

WARD, W. A.—"Making mantle rings or supports." No. 12,091.

MAIN'S NEW FOLDER IS READY.



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Place your Season's Orders early.

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WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 3, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Meters, Fires, and Cookers at Salford.—According to the minutes of the Salford Gas Committee to be submitted to the Town Council to-morrow (Wednesday), at the monthly meeting, a report will be presented from the Finance Committee as to the acceptance of new loans (of which the following is a summary) and to adopt a resolution thereon: Gas-works, £2625; meters, fires, and cookers, £20,900.

Proposed Advance in Price at Rochdale.—At the monthly meeting of the Rochdale Town Council on Thursday, the Gas Committee will ask for confirmation of a decision arrived at last Friday to increase the price of gas 4d. per 1000 c.ft. for all purposes. The present charge is 3s. for lighting; and for heating or power, the prices have ranged from 2s. 8d. to 2s., according to the quantity consumed. The last increase in price took place in June, 1915, when an advance of 6d. per 1000 c.ft. for lighting and 8d. for cooking was made. The 3s. 4d. per 1000 c.ft. now proposed is the highest charge made for gas at Rochdale since 1882-4, when the price was 3s. 6d. The surplus on last year's working of the gas undertaking was not sufficient by £2258 to meet the annual allocation of £6000 to the renewals fund. War bonuses, &c., granted to employees since June last are estimated to cost £2600 more than budgeted for; and an extra £700 is required for the cartage of coal, or a total of £5558. The increase of 4d. on the present prices will yield an extra revenue of about £5350.

Coal Gas for Motor Traction at Leeds.—The Leeds Corporation Gas Committee are arranging to instal plant at several of their works and gasholder stations for filling the reservoirs that have for some time been carried experimentally by a number of motor vehicles. The price of gas for this purpose has been fixed at 4d. per 100 c.ft.; so that to fill a reservoir such as is carried on a van with a 16 to 20 H.P. engine will cost about 1s.

Romford Gas and Coke Company, Ltd.—The report adopted at the recent meeting of the Company stated that the revenue profit for the half year ended June 30 carried to profit and loss account was £3736; and adding £5 for interest on mains laid on undeveloped estates, there was a gross profit of £3741. With the balance brought forward there was an available total of £7696. After providing for interest on the reserve and insurance funds, debenture bonds, consumers' deposits, and loan from bankers, there remained a net balance of £6929. Out of this sum, the Directors recommended that dividends of 6⅜ p.ct. on the original shares, and 4⅞ p.ct. on the "B" shares, both less income-tax, be declared for the half year, leaving £4041 to be carried forward. The sale of gas showed an increase of 13·81 p.ct. over the corresponding half of 1916. It was with regret that the Directors announced the death in April last of their colleague Mr. W. D. Child, who had served the Company for the period of forty years.

STOCK MARKET REPORT.

The general position of affairs on the Stock Exchange took a favourable turn last week, in the form of a welcome access of activity to a degree which could hardly be looked for in the last week of August. But, as in the preceding week, this phenomenon was to be found most abundant in the Miscellaneous group, especially in industrial and kindred undertakings. The prevailing tone, though subject to some counter-tendencies at times, was on the whole stronger, particularly at the close. Towards this, the war news from all the Western Fronts was a contributary factor, though Russian news was still a damping set-off. There is plenty of money about, the results of trade profits; and the possessors are growing more emboldened to speculate on peace prospects.

The gilt-edged market was not at its best; and Home Government issues had a cold fit for some time, but hardened before the close. Colonial and Indian were stronger. In Home Rails, dulness was the general feature, though Undergrounds rose in response to the advance in fares. The American Market was dull, and Canadians participated, though the Government Bill to acquire the Northern line had passed the House. Argentines were better.

Among the Miscellaneous, Rubber was firm and Oil fair. Much attraction was found in Explosives, Nitrates, and Iron and Steel.

Business in the Gas Market would have been below a fair average in point of aggregate bargains, but for renewed activity in Primitivas, which were plentifully dealt in at prices better than last week's advanced figures. Apart from these, the general tone was quite satisfactory. By far the greater number of changes in quotation were *ex div* variations in which the turn was favourable; but among the rest Gas Light ordinary and maximum and the three Sheffields made advances. On Thursday and Friday, some bargains were marked in the new South Metropolitan preference stock issue.

In the Money Market there was a good demand at first, but conditions eased materially later.

Bargains done for cash during the week were as follows: On Monday, Brentford "B" 76, Brighton and Hove "A" 103½, 104, Commercial debenture 52, 52½, Gas Light ordinary 71, 71¼, Imperial Continental 80¼, 80½, Oriental 105, Portsea "C" 76, 76½, Primitiva 46s., 46s. 6d., ditto preference 66s. 3d., 67s. 6d., South Metropolitan debenture 56. On Tuesday, Cape Town debenture 61, 61⅜, Commercial 4 p.ct. 74, European 11, Gas Light ordinary 70½, 70⅝, ditto maximum 57, ditto preference 71¾, 72, Imperial Continental 80½, Oriental 105½, Primitiva 45s. 3d., 46s., 46s. 6d., 47s., 47s. 6d., ditto preference 65s., South African 8⅛, Southampton 75, 75½, 76. On Wednesday, Gas Light ordinary 70½, Imperial Continental 81, 81½, Primitiva 46s. 3d., 46s. 9d., 47s., 47s. 3d., 47s. 6d., ditto preference 65s., 66s. 10½d., ditto debenture 79. On Thursday, Commercial 4 p.ct. 73¼, 73½, Gas Light maximum 57½, ditto debenture 56⅜, 56½, Imperial Continental 81, 81½, Primitiva 45s., 46s. 3d., 47s. 3d., South Metropolitan 72½, ditto debenture 56¼, ditto 5 p.ct. preference 94¼, 94½, Southampton 75¾. On Friday, Gas Light ordinary 70½, 70⅝, 71, 71⅜, ditto preference 71⅜, ditto debenture 56½, Imperial Continental 81¾, 83, Primitiva 45s., ditto preference 62s. 6d., South Metropolitan 5 p.ct. preference 94½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref. .	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5⅛	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water — 10 p.c.	29—30	23—25*	..
383,110	10	,,	7	7%	Bournemouth Gas and Water — B 7 p.c.	15—15½	10½—11*	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13½—14	9—9½*	..
159,740	—	—	—	4%	Bournemouth Gas and Water — 4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid. .	261—266	79—82	..
734,920	,,	,,	11	4⅞%	Do. B New . .	204—209	76—79	76
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb. .	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig. .	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	103½—104
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk..	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2⅜—3½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref. . .	4—6	6½—7½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	61—61⅜
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	78—79*	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk. .	106—108	70—72*	73½—74
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do. .	103—105	64—66*	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	52—52½
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11¼%	Croydon B and C 7 p.c..	..	165—175*	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5¼%	Derby Con. Stk. . . .	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd. . . .	17½—18	11—12	11
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke — 4 p.c. Ord. . .	98—102	70—72	70½—71⅜
2,600,000	,,	,,	3½	3½%	Gas Light and Coke — 3½ p.c. max. . .	76—79	56—58	57—57½
4,062,285	,,	,,	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	70—72	71⅜—72
4,674,850	,,	June 11	3	3%	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	55—57	56½—56⅝
130,000	,,	,,	10	10%	Gas Light and Coke — 10 p.c. Bonds .	..	..	..
258,740	,,	Mar. 12	5	4⅜%	Hastings & St. L. 3½ p.c.	87—89	50—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7½—8½	..
86,600	—	—	—	9½%	Hornsey 7 p.c.. . . .	..	120—130	..
131,000	Stk.	Mar. 12	7⅛	7⅛%	Ilford A and C. . . .	151—154	95—100	..
65,780	,,	,,	6⅜	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb. . . .	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental .	150—160	79—84	80½—83
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c. .	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	81—82*	..
					Liverpool 5 p.c. Ord. B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅜—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11½—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	70½—71½
529,705	,,	June 26	3¾	3¾%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c. .	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	80½—83
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B . .	128—131	83—88*	..
100,000	50	,,	12	11%	Do. C . .	118—121	73—78*	76—76½
52,000	50	,,	10	9%	Do. D . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅛—6	2 3/16—2 7/16	45/-—47/6
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref. .	4⅜—5	3⅛—3⅜	65/-—67/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb. .	91—93	78—80	79
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb. .	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo — 6 p.c. Pref..	10½—11	7⅞—8½	..
125,000	50	July 1	5	5%	San Paulo — 5 p.c. Deb. .	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Do. B	222—224	182—186	..
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African. . . .	10½—11½	8½—9½	8½
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord. .	111—113	71—73*	72½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb. .	72½—74½	55—57	56—56½
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139*	..
952,795	,,	,,	6	4⅜%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref. . .	110—112	75—77	..
135,000	—	—	—	4⅜%	Do. West Kent . .	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord. . .	99—102	76—78	75—76
120,000	,,	Feb. 12	7½	5⅛%	Tottenham and District — A 5 p.c. .	135—138	92—97*	..
782,275	,,	,,	6	4%	Tottenham and District — B 3½ p.c. .	115—117	66—71*	..
181,255	,,	June 26	4	4%	Tottenham and District — 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	Feb. 26	8⅜	72/6	Wandsworth A 5 p.c..	151—156	112—117*	..
255,636	,,	,,	6¼	57/6	Do. B 3½ p.c. .	129—134	97—99*	..
108,075	,,	,,	5/17/3	50/9	Do. C 3½ p.c. .	110—115	84—89*	..
352,000	,,	,,	6⅛	51/3	Wimbledon 5 p.c. . .	117—122	85—90*	..
98,000	,,	,,	6⅜	57/6	Epsom 5 p.c. . . .	121—126	93—98*	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk. . .	66—69	50—53	..

* Ex. Div.

An outbreak of fire on Saturday night in Cumberland Street, Pimlico, resulted in the death of an elderly woman, whose clothing became ignited at a gas-stove.

At the half-yearly general meeting of the British Gas Light Company, Ltd., to be held this month, the Directors propose to recommend, subject to audit, a dividend at the rate of 10 p.ct. per annum, with a bonus of 2s. 6d. per share, for the six months ended June 30 last, both less income-tax, and payable in October.

The British Westinghouse Electric and Manufacturing Company, Ltd., of Trafford Park, Manchester, forward a copy of the statement of receipts and payments on account of their employees' war relief fund, from Aug. 22, 1914, to June 30, 1917. Of the total sum of £43,093 contributed, £29,102 has been given by the employees and £13,990 by the Company. Out of this amount, £25,835 has been paid to dependants, £11,678 has been set aside for a disablement and dependants' fund, and over £2080 has been spent in donations to local and national funds, &c. The number of families in receipt of relief is 718; and 2702 employees have joined the forces.

The Scotch Shale Miners' Association state that negotiations have been completed for the Government to at once release shale miners from the Army to return to the mines. The plans of the Government for increased production are on a large scale; and it has been decided to add greatly to the man-power of the Scottish shale mines.

It was reported at a meeting of the Shipley District Council last Tuesday that the Finance Committee had been visited by Mr. W. Brindley, of the Coal Controller's Department, who put forward the Controller's proposal that local authorities should arrange with merchants for sufficient coal to be available during the winter for the use of the poor people who cannot afford to stock now. It was pointed out to Mr. Brindley that the Shipley Gas Department have already entered into an agreement for the purchase of 1000 tons of coal which was suitable for domestic use, but which was intended for the production of gas in the event of the ordinary gas coal being short. If this coal were not required for gas, it would be available for the public. Mr. Brindley asked if the coal could not be definitely set aside for the public; but the reply was that it would depend upon the requirements of the gas-works.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

STOKERS. No. 6346.
RESIDENT ENGINEER AND MANAGER. Annfield Plain Gas Company. Applications by Sept. 10, to 50, Cannon Street, E.C. 4.
CHEMIST. No. 6336, 6344, 6345, 6348.
FOREMAN. No. 6350.
WORKING MANAGER. No. 6349
WORKING MANAGER. Mildenhall Gas Company.

Appointments Wanted.

ACCOUNTANT, CASHIER, OR SECRETARY. No. 6343.
WORKING GAS MANAGER. No. 6340.
CHEMIST. No. 6348.

Plant, &c. (Second Hand), for Sale.

BOILERS AND TANKS. Stanley Engineering Company, Bath.
PIPES. T. C. Jones & Co., Shepherd's Bush.

Plant Required.

SUCTION GAS PRODUCER PLANTS. No. 6339.

Tank Wagon Wanted to Hire.—No. 6347.

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See Illustrated Advertisement, Aug. 28, p. 358.

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BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite inquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

MEWBURN, ELLIS, AND PRYOR.
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70, Chancery Lane, London.
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GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

The Needs and Instructions of Government Departments.

THE war has hurriedly created a Government organization of immense proportions; and it could not be expected that such a ponderous piece of machinery could be brought into existence with such precision that the cogs of the wheels would all fit and run without friction. More especially is this the case with a war of such dimensions and ramifications as this, with the fluctuations that it produces from day to day, and with requirements following suite. Those behind the scenes—the Admiralty, the War Office, and the many departments organizing and supervising the work and provision of the necessaries for the war—are the only ones who know what is the precise position of things. Whether confidences always pass from one department to another with the exactitude that there should be with the object of securing thorough organization and satisfaction—say, in the matter of supplies—is, so not a few observers think, open to question. If this is true, then it explains much. There has been somewhat frequent exemplification of the instructions of one Government Department being seemingly, and in fact have been, opposed to those of another. This sort of thing can only be avoided by intercommunication and full confidence. There is another means by which trouble may obtain. It is, when a certain situation arises, by passing imperative instructions from one department to another, without complete conference, and their transmission for execution outside, where the great powers possessed by the instructing Departments under the Defence of the Realm Act are always present as an incentive to do the bidding of the Departments concerned without any question whatever or with as little as possible. Between the gas industry and the Explosives Supplies Department there has always been the greatest amity. The Explosives Supplies Department is a division only of the Ministry of Munitions; and the Ministry of Munitions is the servant of all the other Departments concerned with the war. We can understand that it may receive instructions as to an imperative necessity, with an intimation that a certain line of action must be taken at any cost. Its machinery would at once be set in motion with the gravity of the position concentrated on the "must." In the case of the gas industry, and to set it in motion, the channel of communication would be the National Gas Council, who are practically helpless in face of insistent instructions having their source in one of the superior Government Departments. The Council are, in the circumstances, a convenience to the Government Departments; and, in the circumstances, if anything goes wrong, it is the most handy of the participants for the gas industry to reproach. The position is not always a comfortable one; and still less so in these times of quick decisions and action. This must be remembered, as well as the fact that the National Gas Council is a body that is subordinate to a Government Department.

The Sliding-Scale and Relief.

THE question of securing some relaxation of the terms of the sliding-scale temporarily (where required), during the war and permanently after, is one which cannot, in the best interests of the gas industry, be allowed to be cast aside. Of course, if all companies were in equal position, the matter of a temporary revision would be relatively an easy matter. But they are not. Some have high standard prices; and the fortunate share or stock holders in them are not suffering in nearly the same degree as in the case of other companies. Other conditions—such as low capital charges—also help to make differences between companies in respect of the effects of the war. However, it is those companies that have been hardest hit through their peace-time legislative ordinances that require immediate relief; and the question is which is the best way of accomplishing this. We understand that the Executive Committee of the National Gas Council will early next month be considering the results of an investigation that has been made into the matter, and which will disclose—if there has been a general compliance with the request for certain returns—a considerable amount of hardship on the holders of gas capital. There will, no doubt, likewise be before the Committee various suggestions for dealing with the situation. To these a contribution was made by Mr. A. M. Paddon at a meeting of the proprietors of the Brighton and Hove Gas Company last Friday, when he proposed the institution of a neutral zone of 4d. within which the standard dividend should not be affected. This would be hardly enough in some cases. However, it is presented for consideration with the rest.

But there is another point that has to be met, and that is the reported representation of the Board of Trade that every individual case would have to be considered, and that this is too vast a business for them to undertake during the war. But not all gas undertakings require relief; and if there were the will, a way would sure to be discovered. The Board of Trade has to be shown the seriousness, urgency, and justice of the claims of the gas industry; and no one knows better than the Board that it has only to agree that something should and must be done, and early means for doing it would be found. Little trouble was made over the Gas (Standard of Calorific Power) Act—in passing it through Parliament, and in giving it operative effect.

Last week we pointed out that, with the view of dealing with extraordinary circumstances arising in other directions from the war, special committees have been appointed, special departments have been formed, and special means have been devised and adopted. Why should not the Board of Trade appoint a specially qualified body of Referees for dealing with the matter of revising the sliding-scale in those cases where necessary—to operate during the period of the war, and for a time after? Precedents are deemed useful things among the Private Bill Authorities and in Government Departments, in which work is largely conducted by the rule of precedent. Then let us go back to the City of London Gas Act, 1868; and there are found what were known as the "Revision Clauses," one of the purposes of which was to ensure that the maximum price of gas should always be correctly fixed. On an application being made for a revision of price under that Act, the Board would appoint for the purpose three qualified Commissioners, who had the power to inspect works, order the attendance of witnesses, call for books and papers, and obtain legal and other assistance. Further information regarding this precedent is to be found in (the late) Mr. Laurence Rostron's book on "The Powers of Charge of the Metropolitan Gas "Companies." Of course, the purpose is not exactly the same; but the idea as to the tribunal might be useful when preparing a plan which would meet with the acceptance of first the Board of Trade and then of Parliament. In this matter, we have taken our stand upon common justice; and the case that can be presented in support of parliamentary action to secure justice is, we believe, both a sound and an unanswerable one.

The Geographically Re-Arranged Coal Contracts.

For delivery of coal under contracts, the redistribution scheme of the Coal Controller (Mr. Guy Calthrop) entered actively upon its work as from six o'clock last Saturday, by abrogating all pre-existing coal contracts, except those referring to coal produced and consumed within the same area, seaborne coal, and those for railborne coal which fortunately complied with the plan. For those whose contracts have had to be cancelled, and new ones effected, the time since the promulgation of the scheme early in July has been rendered by it doubly eventful. On the one hand, there has been a struggle to get in as much coal as possible under the now non-existent contracts; and, on the other hand, there has been the fixing-up of the new contracts for coal from the authorized fresh sources. This, in some instances, has not been an easy matter, even with the assistance of the reinforced Coal and Coke Supplies Committees; and now numbers of gas engineers are concerned as to the character of the coal with which later on they will be working. Most engineers with whom we have come into contact have got in good stocks under their old contracts; and many of them have expressed satisfaction with the way in which their contractors have been helping them during the summer months to accumulate stocks of the brands of coal which they know. With the shifting about of the contracts, to avoid prohibited relationships and to establish new, there will undoubtedly be some works that will get coal of an inferior quality for gas and secondary products making than that to which they have been accustomed, while with others the contrary will be the case; and these changes will have, or rather they may have, their money disadvantages. Some engineers are anticipating this with anything but comfortable feelings. But at the same time, they realize that it is only sheer necessity that commands the economizing of railway transport as far as possible during the winter months, and that such a vast rearrangement could not possibly be brought to pass without some attendant trouble. To have planned and brought into existence a scheme that went like a piece of perfect mechanism would have been a superhuman performance; and Mr. Guy Calthrop claims to be as human as the rest of us. His scheme has been developed for a special purpose; other purposes have had to suffer. The proof of the practicability of the project for the special purpose is entering upon its test; and we may hope that it will assert that the Coal Controller has been right, and his critics wrong. Otherwise there will be chaos just in the season when the smoother the working of coal despatch, transit, and delivery, the better. Truly, the Coal Controller has taken a bold step; and now for its justification.

The North British Presidential Address.

The President of the North British Association of Gas Managers (Mr. J. Lang, of the Vale of Leven Gas Company) was in happy and optimistic mood at the meeting in Glasgow last Friday. We have all got our war difficulties to face; and gas engineers and managers have had not the smallest apportionment of them. But Mr. Lang comforts himself with the old Scotch saying: "There's never a bad, "but there could be a waur'." A genial disposition that which finds trouble the lighter by the thought that it might be worse, and happier still the one who cheerfully faces war-time difficulties stimulated by the fact that, in so doing, he is performing his allotted part in working for the defeat of the enemy. At the same time, the best use must be made of the industry's opportunities to its permanent advantage. Lord Moulton last June paid a handsome tribute to what the industry has done in saving the nation from the threatened terrible consequences of inexcusable negligence. This tribute ought, Mr. Lang thinks (and we fully agree) to have a large publicity among the customers of every gas undertaking. By the reproduction of the tribute on a leaflet, or on the back of the next gas accounts, there could be fulfilment of the wish.

That, however, was a certificate to good character by one who is doubly qualified to give it; but another certificate to the potentiality of the industry is found in its actual war-time work. Whatever the local circumstances of gasmen, there is unanimity in agreeing that what the gas industry is doing will be to its permanent advantage. Undoubtedly this is so. But the degree of this permanent advantage will, to a very considerable extent, be governed by the means taken to promote it. The industry has secured a decided lead by the very facts of availability, ease of adaptation, and results. Mr. Lang, as Engineer and Manager of the Vale of Leven Gas Company, has given what is, we should imagine, a unique proof of this for an undertaking of the size of that under his management, and to no less a firm than that of Messrs. Sir W. G. Armstrong, Whitworth, & Co. They wanted gas for munition purposes; and it was the Gas Company's business to supply it. And though it has meant in two years more than doubling the business that had been built up during the whole life of the concern, it has been done. There is one regrettable circumstance—and Mr. Lang is not the only manager who has reluctantly had to come to a like conclusion—which is that munition requirements have compelled the cessation of the installation of gas cookers and other appliances. The reason for the temporary abandonment of new business in this direction is not the same in all cases; but whatever the reason—munition works requirements, gas-producing capacity, coal, labour, or what not—the pity of the rejection or filing-away of the applications is that these would all have meant permanent business. However, the position cannot be helped. It is a question of making the best possible of it, and utilizing personal effort, when conditions again undergo change, in recovering the proffered fresh custom.

The war experiences of the Vale of Leven Gas Company make quite a good story; the war experiences of the gas industry of Scotland generally have brought to the front schemes for departures from existing co-operative circumstances. The Home Rule scheme for the Scotch gas industry appears to be strongly in the ascendant—not through separation from the National Gas Council, but through a Council composed as described in the address, and one which should work for Scotland in conjunction with the National Council. We have before discussed this point. There are attendant advantages and disadvantages. Among the advantages are that a Scotch Council would be in close touch with the requirements of Scotland; and it would relieve the National Council from some of the detail work appertaining to the industry north of the Tweed. This is being written before the report of the discussions at the meeting has reached us; and there may be later on a call for further reference to the subject. Another innovation is the appointment of Mr. Gemmel, of Edinburgh, as the Chemist and Analyst for those undertakings that have not a chemist as a member of their own staffs. A schedule of rates at which Mr. Gemmel will test samples has been agreed upon. Of course, benefit will be found in having a recognized chemist whose work will keep him specialized in the needs of the gas industry. This scheme, however, is in substitution of the provision of a central gas laboratory in Edinburgh or Glasgow, which was found by the Council of the Association to be rather too ambitious for consideration at the present time.

Continuous Verticals in a Fifty Million Works.

There is a strictly impartial tone about the paper that Mr. H. G. Ritchie, of Irvine, read before the North British Gas Managers' Association last Friday. It was a frank statement of his experiences with an installation of Woodall-Duckham continuous vertical retorts. He praised where praise was due; he did not refrain from placing on record the modest difficulties he had experienced, and his views as to the suitability of such settings for works of no greater output than his own. But the final result is the basis for judgment. Mr. Ritchie's experience is that, though vertical retorts do not eliminate all worries, and they require more skilled supervision than the ordinary stoker is capable of, the reduced anxieties due to labour troubles have amply compensated him for the extra attention he has to give to the vertical retort installation.

The paper—which must be taken as a whole, and not any one part skipped, or an injustice may be done to the system—demonstrates that the continuous vertical retort system is applicable to quite small works, as well as to large ones. There are only six 3-ton per day retorts, which have a guaranteed output of 250,000 c.ft.; but without pressing, and without the use of blue water gas, Mr. Ritchie has secured over a month an average daily output per retort of 50,200 c.ft., or equal to a total of 301,200 c.ft. The maximum day's output per retort has been 59,000 c.ft. The figures indicate that the contractors believe in a good margin of safety in respect of their claims. But even these considerable figures over the guarantee could be largely

exceeded, if it were an economy to purchase a still better class of gas-making coal. Coking nuts are being carbonized; and a make of 12,039 c.ft. of 520 B.Th.U. gas is being obtained, which is 2337 c.ft. better than with the old horizontal working. The first results recorded in the paper are very indifferent ones; and for a simple cause which the author shows was capable of remedy in a simple manner, as explained in the paper. From this instance, the lesson may be drawn that it does not always do to look to big things for the cause of disappointment; it is often the case that it is something trifling that creates disturbance and adverse results. From the last set of tabulated figures in the paper, it will be noticed that, with different classes of coal, considerable make variations have been obtained by the setting; and we only mention this to enforce the elementary, but often forgotten, point that judgment should not alone be based on ordinary working experiences with any carbonizing system without taking into account the quality of the coal employed, an analysis of which in this case is missing from the paper. But from the same set of figures, another interesting feature protrudes; and it is that with any class of coal, with continuous vertical retorts, the make can be regulated to a nicety, so as—providing temperatures are sustained—automatically to keep approximately to the calorific power desired. It will be observed from the data how, with the different varieties of coal, and the different makes per ton, the calorific power does not widely diverge. This is largely due to the fact that a nice adjustment of the rate of speed of the travel of the charge in relation to the character of the coal is possible through the medium of the coke-extractor; and this also gives an elasticity to producing power which is particularly valuable to smaller works the conditions of demand upon which do not necessitate a considerable margin of retort power. The amount of coke for sale—about 7½ cwt. per ton of coal—appears to be rather low, and suggests a fuel account equal to that of the old horizontal settings which were in "very bad order."

The Ministry of Munitions are desirous just now that, as far as possible, coal shall be carbonized for gas making in order to produce the maximum supply of fuel oils. But this does not detract from any current contribution to the economic question of the supplementing of make by steaming or the addition of blue-water gas. Mr. Ritchie during the past week has been making experiments with steaming in one of his vertical retorts; and, from a make of 12,039 c.ft., he has gone up to one (with steaming) of 13,363 c.ft.—an increase of about 11 per cent., while the calorific value has only suffered by 2 p.ct. This is good; but it is a question whether it cannot be bettered. It is the opinion of the author that it could be if the hottest zone was further down the retort; and this could be arranged without much structural alteration by carrying the secondary air supply lower down the retort. This closely agrees with the contention of Mr. J. E. Blundell, of Macclesfield, that the hightest temperature should be towards the bottom end of the carbonizing portion of the retort [*ante*, p. 106].

Of course, capital costs are at all times a consideration to any gas-works, and especially to one of limited opportunities. Just now, particularly, one cannot afford to waste money, nor even to consult one's fancies if useless expenditure is to be the result. Vertical retorts, however, lend themselves more especially to light constructions; and Mr. Ritchie illustrates how, in order to economize in building, he has had the vertical setting installed in an old coal-store, and has continued such protection as is necessary with a very light and comparatively inexpensive structure. Economy in non-productive capital expenditure is quite a legitimate thing; but it must be said that round and over the modern types of plant, we do like to see a harmonizing building wherever possible. The light steel-framed buildings that are now erected for this purpose answer admirably, and cannot in normal times be accounted expensive or a waste of money. However, that merely by the way. These are not normal times; and needless expense in them has no justification. Mr. Ritchie and his Company must be congratulated upon their enterprise; and they are quite satisfied that they have done the right thing, which is the main consideration.

The Crudity of the Dehydration Process.

Very few gas engineers, and certainly no gas chemists, have been inclined to give tar dehydration plants that have been so largely installed on gas-works credit for more than they are worth. They have been of considerable value during the war, and have greatly facilitated work for the Ministry of Munitions, have economized in crude tar transport, and have placed at the disposal of the road authorities close to the points of tar production the refined tar to the use of which they are limited by the central authorities. While the plants have been highly serviceable, no one would attempt to match their efficiency against that of complete and properly supervised tar-distillation plants. However, if any one has been under any misapprehension as to the status of the dehydration form of plant, he will find himself set right in a very instructive paper that Mr. G. H. Sharples, of Glasgow, read before the North British Association last Friday. The dehydration plant is shown by comparison with distillation plant, through analytical data, to be a crude and wasteful process. Nevertheless it has its useful place, and has served its useful purpose, and will continue to do so in many places not equal to the installation of tar-distillation plants, or where co-operative work is impossible, or where the trading tar distiller is not reasonably fair to the producer. The dehydration plant is, we believe, the first step to large developments in the gas industry. Mr. Sharples shows by his data wherein the dehydration plant fails. Take two points only—naphtha and tar acids. In the dehydrated tar there remain considerable quantities of naphtha; and in the lighter portion of the heavy oils left in the dehydrated tar is found a large quantity of tar acids. These are examples of the general inefficiency. The practice of rectification in small stills is also condemned. "No "real separation into the pure products—benzene, toluene, "xylene—could be made in these small stills." This has been quickly realized; and in many cases the crude oil is now turned over to the tar distiller for treatment.

The case presented in the paper is perfectly true; but it does not alter the fact that many gas-works are now doing better commercially with their tar than they would be if they handed over to the tar distiller the whole of the crude stuff. It is the commercial side to which they have to look; and keeping this steadily in view, there are bound to be developments from the present position, in accordance with the (to the producer) most profitable utilization of the tar. In the comparison made by Mr. Sharples in the first table, as to the composition of the tar yielded with the same class of coal by two different works, but at the one carbonized in horizontal retorts and at the other in vertical retorts, we hardly think the figures can be taken as representative of heavy-charge working in horizontal retorts, with the free space limited; and therefore the figures, if our surmise is correct, would not be quite fair to contemporary working with horizontal retorts. At the same time, generally speaking, with the best horizontal working, the quality of the tar does not, as a rule, come up to that of the vertical retorts in the matters of light oils and creosote oils, and the lower quantity of pitch. But for the purposes of the war, owing to the "paraffin" reasons disclosed in the third table, the products of the horizontal retorts are preferred. The point is also raised by the author as to whether, having in view the making of pure products, it would not be advisable to work-up separately the tar from horizontal and vertical retorts. It no doubt would be. But there are practical difficulties at many works in regard to separate tar storage; and unless there was some sufficient return to the tar producers to justify the separation, it would not, in the majority of gas-works, pay to carry-out the suggestion. In large gas-works, with considerable installations of both systems, the case would be different.

A Tightened Control over Tar.

Not long ago, there was an Order as to creosote oils; since then one has been issued in reference to "crude benzol, crude naphtha, and light oils;" and now comes one as to coal tar—the secret of all this being that the Ministry of Munitions must have complete control and use of certain of the products of tar distillation. Fuel oils is an essential of considerable importance. The new Order as to tar is a stringent one; and it will interfere somewhat with the freedom of trading in both crude and dehydrated tars without a Licence from the Ministry of Munitions, excepting as between producers and distillers. The sale of crude tar has to all intents and purposes been prohibited from the first year of the war, through the reservation to themselves originally by the War Office and then by the Explosives Department of the Ministry

of Munitions, of all tar substances containing toluol. But for a time there were leakages in the direction of road use; and this resulted, towards the end of 1915, in the Road Board being requested by the Ministry of Munitions to see that arrangements were promptly made which would absolutely prevent the use of crude tar on highways and footpaths during the continuance of the war. We think it may be said that fairly generally there has been compliance with this request. But gradually the Ministry has found it necessary, owing to requirements, to get a still closer grip over production and disposal. Last year there came the request for returns as to production, stocks, &c. Now from the 1st prox., no person will be allowed to purchase or offer to purchase any coal tar—whether crude or dehydrated—without a Licence by the Ministry of Munitions. Exception is made in the case of tar distillers for the purchase of crude tar provided it is to be distilled by them. But no transactions may take place by a tar distiller in resulting treated tar without a Licence, save under a condition which applies generally and to both crude and dehydrated tar in small quantities. This allows transactions without Licence in quantities not exceeding 10 gallons, provided the total purchased in any one calendar month does not exceed 50 gallons. The new Order is printed *in extenso* in another column; and particular attention should be paid to the fact that current contracts are not exempt from control under the terms of the Order.

From the Land to the Gas-Works.

From the British gas-works to the land of the farmers there has this year passed very many thousands of tons of sulphate of ammonia, at a modest price under the conditions of its production. The fertilizer has caused the earth to yield her increase, has brought more profit to the farmer, and has necessitated a large number of additional hands for the harvesting. Harvest time will soon be over. From the land the hands specially engaged for the reaping will soon pass, and will be taking up some fresh employment. One good turn deserves another. The gas industry will soon be wrestling with its annual peak-loads under all the unfavourable conditions that an evil ingenuity could possibly marshal. One of these unfavourable conditions is labour. The gas industry will want more; and it will, if help is not rendered, be very difficult to get. Cannot those Ministers who have been so considerate to the agricultural industry at the expense of a heavily burdened gas industry do something to mobilize these farm hands and transfer them to the assistance of the latter during the days of its greatest pressure? Whatever the character of the work such hands undertake in connection with gas operations, they will be helping to contribute to the production and stocks of sulphate of ammonia for next year's agricultural work and developments. Providing, too, the Coal Controller can arrange for adequate coal supplies, the transferred farm hands would be doing a part to enable the gas industry to supply more gas, and thus more benzol and toluol, fuel oils, and the many other requirements of the Ministry of Munitions. We hear of gas undertakings which are, as a precautionary measure, declining to fix more gas-heating appliances, so that those already connected may not have to go short of gas. The boundary set by plant capacity to the public services of a gas-works is an unavoidable obstacle; but in some cases the deficiency of labour upon the works is an important factor in their supply conditions. Where relief can be given in this direction, it will be for the public and the national good. The less gas the industry supplies in winter, the more coal will be consumed in households. And that coal is the most labour-consuming of any fuel right away from the coal truck or ship's hold to the domestic grate; and all the coal contains is dissipated, with the exception of about 20 per cent. of its heat value. It should need no argument to show how much the economy of the nation can be served and paramount needs satisfied, by giving the gas industry all the labour that it can usefully absorb. Hence the suggestion that gas-works labour should be recruited from those farm hands whose harvesting services will now soon be ended.

Coal Factors' Prices.

The negotiations that have been pending between the Coal Controller and the coal factors and merchants have come to an end; and the decision as to the excess prices that they may charge are now embedded in what is called the "Wholesale Coal Prices Order," which was issued last week. The excess figures (as will be seen elsewhere) are practically the same as those reproduced in our columns lately [*ante*, p. 321] from the "Iron and Coal Trades Review." But the anticipated conditions attached to the prices have perhaps undergone some modification. The prices practically cover all sales through factors and merchants for inland consumed coal in Great Britain and Ireland. The excess price is upon the pit charge, or, in the case of washed fuel the price chargeable for the fuel at the washery by the owner of the fuel by whom, or on whose behalf, it was washed. The actual cost of transport is to be charged; but in respect of transport no profit is to be made, inasmuch as in this cost "no charge shall be made by the seller of the coal in respect of office expenses, salaries, or other overhead charges or loss in handling." As to the extra charges, these are not to exceed 3d. per ton for coal supplied to railway companies. This is an advantage of 3d. over national factories, which are to pay 6d. per ton, and 6d. over gas and electricity undertakings, which are to pay 9d. per ton. Other coal will pay 1s.; while Ireland will pay 1s. 3d. a ton for "all coal."

Supplementary Conditions.

There are a number of conditions attached which will have to be studied. Among others, it will be seen that, no matter how many hands the coal passes through, they will only be allowed to divide the one fixed extra. Prices of current contracts become subject to the provisions of the Price of Coal Limitation Act and of this new Order; but there is provision for an appeal to the Coal Controller for relief. The Controller evidently does not intend to allow purchasers to go bargaining in a manner that will give them advantage. It will be noticed that it is decreed that "no person shall sell or buy, or offer to sell or buy, any coal at a price exceeding the maximum price hereby fixed;" and the Coal Controller is invested with all power to see that the Order is obeyed. Both buyers and sellers will therefore have to investigate present contracts to see that they come within the terms of this Order. The "Iron and Coal Trades Review" recently stated that the scale of prices was regarded as very unsatisfactory and unfair, seeing that it did not include office and other expenses, which were alone sufficient to absorb the smaller allowances in the majority of cases. Whether or not there is any legitimate ground for this assertion, the fact remains that further negotiation has not succeeded in altering the amounts. On the other hand, we understand that the coal factors are not displeased with their 9d. per ton from gas undertakings. Seeing that it stands where it does in the scale, we can well believe this to be true. We have known coal factors who have made a very respectable position in the world on much less than 9d. per ton on their gas coal contracts.

Commercial Intelligence Organization.

With the conviction that the demands upon the Government for the collection and diffusion of commercial intelligence for the benefit of the trade of the United Kingdom are like to be very much greater after the war than has been the case in the past, the Board of Trade and the Foreign Office have for some time past been maturing plans for developing and improving the official arrangements for commercial intelligence, so far as they fall within their scope. The result has been the issue, as a Parliamentary Paper, of a joint memorandum on the subject, setting forth a scheme which has been sanctioned by the War Cabinet. From this it appears that the Board of Trade have obtained the sanction of the Treasury for a large development of the Department of Commercial Intelligence, and for a wide expansion of the system of Trade Commissioners within the Empire. Further than this, the Foreign Office have elaborated schemes for strengthening and developing the Commercial Attaché and Consular Services, and for increasing their utility to British trade. Parliamentary control over the enlarged Commercial Intelligence Department which is to be created will be exercised through a new Parliamentary Secretary; and the Department will eventually comprise the existing Commercial Intelligence Branch of the Board of Trade and the Foreign Trade Department of the Foreign Office. Smooth working of this combined scheme should be fostered by the contemplated constant interchange of staff between the Department and the Foreign Office and the Board of Trade, so that all may be thoroughly acquainted with the work. Another point is that opportunity will be given to diplomats and consuls in training to serve for a period in the Department. A good

feature is that the Department will be assisted by an Advisory Committee of business men; and it is hoped that a Sub-Committee of this Committee may meet at frequent intervals to advise the Department on current work. It is believed that the scheme, by securing uniformity of policy in respect of overseas trade as a whole, will afford a satisfactory solution of a problem which has for some years past been drawn attention to by the commercial and industrial community.

OBITUARY.

Alderman LAZARUS HART, who died last Friday at the age of 86 years, had been a Director of the Isle of Thanet Gas Company (Margate) for thirty years, and for exactly half this time had acted as Chairman. During the whole of his chairmanship he had, until last month, missed only one attendance. Alderman Hart was also Chairman of the Broadstairs Gas Company, and of the Ash-next-Sandwich Gas Company, Ltd. For two succeeding years he was Mayor of Ramsgate, of which borough he was Senior Alderman and a Justice of the Peace. Through his long association with the industry, he had acquired an extensive knowledge of gas matters; and in this and other ways his loss will be much felt in the locality. The funeral took place on Sunday, amid manifestations of deep mourning. The deceased gentleman was cousin to Sir Philip Magnus.

PERSONAL.

The Doncaster Gas Committee have appointed Mr. D. T. LIVESEY, of Tunbridge Wells, as Assistant Gas Engineer, to succeed Mr. H. J. CARPENTER, who has accepted a position at Peterborough.

Mr. JOHN FLANNERY, of Nenagh (co. Tipperary), has been elected Manager of Nenagh Gas-Works, in succession to Mr. BYRON, who has left for the Isle of Man. There were thirty applicants for the position.

Mr. WALLACE SUGDEN has been appointed to fill the vacant position of Chemist to the Stretford Gas Company, applications for which were asked for by advertisement in the "JOURNAL." Mr. Sugden, who is at present engaged at the Bradford Road works of the Manchester Corporation, received his early training at the Stretford Gas-Works.

It is gratifying to learn that Captain G. W. BIDWELL, who joined-up nearly three years ago, and was wounded through the right lung in Gallipoli, is to all intents and purposes now quite fit again. After being in England for a year, he voluntarily joined a Labour group at the front, and has served at this work for over twelve months, within shell fire the whole time. The experience thus gained in the control of a very large body of men should stand him in good stead with the return of happier times.

In our issue for July 3 a report appeared to the effect that Lieut. J. W. BROWN, of the R.F.C., was dangerously ill with concussion of the brain, through the collapse of his aeroplane in mid-air while engaged in operations in East Africa. He lay unconscious for practically three days; and then, while in hospital, his physical condition was rendered worse by an attack of malaria. We are pleased to say Lieut. Brown arrived home last Sunday week, by hospital ship from Cape Town; and his friends in the gas profession will be glad to learn that he is now well on the high road to recovery.

At the Litchurch works of the Derby Gas Company, the Chief Foreman, Mr. T. MASON, has been presented with an illuminated address, a purse of money, and other gifts, on his retirement after serving 46 years with the Company. The Engineer and Manager (Mr. J. Ferguson Bell) presided, and was supported by the Resident Manager at Litchurch, Mr. R. Fisher. Dealing with Mr. Mason's long association with the Company, he emphasized the benefits likely to accrue to employers and employed from such a continuity of service, and expressed the hope that their friend would be long spared to enjoy his well-earned retirement. Mr. Fisher said that for 21 years he had worked with Mr. Mason, and had always found him an ideal foreman. The presentation was made by Mr. Longdon (the oldest employee).

The will has been proved of the late Mr. Walter Cliff, of Melbourne Hall, near York; the estate being valued at £504,746. Mr. Cliff was formerly a proprietor of the business of Messrs. Joseph Cliff & Sons, fire-brick makers, of Wortley. Probate has also been granted of the will of Mr. Cliff's elder brother, Mr. William D. Cliff, the value of whose estate amounts to £229,380, with net personalty £171,885.

There are published in the "American Gas Institute News" the subscriptions to the "Liberty Loan" in connection with the war of a number of gas companies and their employees. The figures are: Gas companies, $10,532,150; employees, $3,709,130; total, $14,241,280. This shows a proper spirit of patriotism; and it has to be remembered that the list is only a partial one. Many companies did not subscribe as companies; and in numerous instances the employees did not subscribe through the company, but through the banks.

INCREASED PRICE OF GAS IN BERLIN.

IN sending on the enclosed translation from the "Vossische Zeitung" announcing a decision to increase the price of gas in Berlin, our correspondent remarks that this may be of more interest now than their continued discussion of the "restrictions."

FROM THE "VOSSISCHE ZEITUNG" OF AUG. 26.

INCREASE OF THE GAS PRICE.

In consequence of the coal tax, the considerable increase in wages, and the higher prices of materials, the Berlin Gas-Works have to provide for an increased expenditure during 1917 of at least M. 10,000,000, while the increased receipts will scarcely exceed M. 2,600,000. The management has, therefore, decided to raise the price of gas from 16 pfg. [4s. 6d. per 1000 c.ft.] to 20 pfg. [5s. 8d. per 1000 c.ft.] per cubic metre, from the date of the meter-index taking in September; and, in the case of prepayment meter and other small gas consumers, using less than 365 c.m. per annum, to allow a reduction of 2 pfg. on this price—*i.e.*, to charge only 18 pfg. per cubic metre [5s. 1d. per 1000 c.ft.]. The discounts hitherto allowed, and the special discounts, &c., will be discontinued as from September. The former discounts due up to the end of September will be settled according to the annual consumption shown at the close of the year.

After full consideration, the magistrates of Berlin have approved of the decision of the managers. The Berlin Town Council will deal with the question of the increase in the price of gas at its first meeting immediately after the holidays.

The English Gas Company will likewise modify the price of gas; and from other towns we learn that discussions over increases in the price of gas are taking place, and that announcements in regard thereto may be expected shortly.

ORDER AS TO COAL TAR (CRUDE AND DEHYDRATED).

THE following order in respect of coal tar (crude and dehydrated) was issued last Tuesday:

The Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Acts, and of all other powers enabling him, hereby orders as follows:

(1) No person shall, as and from the 1st of October, 1917, until further notice, purchase, or offer to purchase, any coal tar (whether crude or dehydrated) except under, and in accordance with, the terms and conditions of a Licence issued by, or under the authority of, the Minister of Munitions. Provided that no Licence shall be required—

(*a*) By a tar distiller for the purchase of coal tar in any quantities, provided that the whole quantity purchased is intended to be, and is in fact, distilled by such distiller.

(*b*) By any person for the purchase of coal tar (whether crude or dehydrated) in quantities not exceeding 10 gallons, provided that the total quantity purchased by any one person during any one calendar month does not exceed 50 gallons.

(2) No person shall, as from the 1st of October, 1917, until further notice, except under, and in accordance with, the terms and conditions of a Licence issued by, or under the authority of, the Minister of Munitions accept delivery of, or make payment for, any coal tar tendered for delivery under any contract existing at the date of this Order unless (*a*) such contract is in writing, and (*b*) full written particulars of such contract have been furnished to the Minister of Munitions before the 1st of October, 1917, by the person for the time being entitled to deliveries thereunder.

(3) For the purpose of this Order, the expression "Coal Tar" shall mean and include tar produced or derived from the destructive distillation of bituminous material by any means other than blast-furnaces.

ELECTRICITY SUPPLY MEMORANDA.

THE publication in the "Journal of the Institution of Electrical Engineers" of the street-lighting specification which emanated from the Joint Committee of various organizations supplies our electrical contemporaries with an opportunity for commenting upon the objections of the minority to the main feature of the specification. The minority is represented by the Institution of Gas Engineers; and the majority is constituted of representatives of the Institution of Electrical Engineers, the Illuminating Engineering Society (which has a larger electrical than gas element in its composition), and the Institution of Municipal and County Engineers, whose interest in this particular matter is partly dominated by the municipal ownership of electrical enterprises. Where there is not this ownership, gas lighting for street purposes very largely prevails; where there is this ownership, it is frequently found that gas lighting is in the streets a diminishing quantity. The criticisms of our contemporaries are directed mainly to the objection of the minority that the minimum horizontal illumination obtained is not for contract

Paying for External Boosting of Illumination.

purposes a correct method of assessing the illumination given by street-lamps, inasmuch as illumination is subject to such extraneous and adventitious circumstances as reflection from buildings, light from other sources, and so forth. Therefore hold the minority a more correct measurement for contract purposes is the average candle power of light sources ascertained at two or three specified angles. The gas minority will not abandon this point; the electrical majority will not give way on their contention, which involves the crediting of the lamps with any advantage secured by location, which would not be the true value of the lamp itself. We have never yet seen any proper defence of this electrical attitude; and our electrical contemporaries do not advance one. The whole question resolves itself into this: Is what the purchasers contract for the illumination given by the lamp *per se*, or the illumination given by it *plus* the kind assistance of its environment. Move a lamp from one place to another, and, under the electrical device for taking into account all the scraps of contribution to the minimum illumination, the lamp will give a different value in the two positions.

A Fraudulent Method.

The "Electrician," in an editorial article, gives the whole electrical game away, and tries to entice the gas people from the path of virtue by a very lame argument. It says: "Reflection from the walls of buildings can scarcely be taken as a serious objection, as such reflection would merely be to the advantage of the lamps supplying the illumination, and would render *it more easy to comply with the minimum*. We cannot therefore consider this particular objection is one that can be well supported." "Would render it more easy to comply with the required minimum!" That is to say, though the minimum illumination from the lamp unaided is below the minimum contracted for, any lucky external aid to boosting-up the illumination so that it can comply with the assessing test is something that should be thankfully received by the seller, and be paid for by the purchaser. The "Electrician" does not intend that there shall be any misunderstanding as to its meaning; for, in mentioning that the Institution of Gas Engineers consider that the correct measurement for contract purposes is one based on the average candle power of light sources as ascertained at two or three defined angles, it says "with this view we disagree, for the simple reason that what is required is not candle power, but illumination." Illumination whence? From the lamp *plus* the accidental contributions of external sources or reflecting surfaces? After arguing in favour of the electrical majority view, our contemporary proceeds to present another point, which is distinctly against itself and the electrical majority. A specification for street lighting can be no good that does not provide a means of measurement of what should be paid for, which is the independent value of the light from the lamp itself, and not a value that is vitiated by something external to itself. Therefore, our contemporary does no good to the point of view of the electrical majority when it writes: "We think that one of the causes underlying the opposition to these standard clauses is that they may be regarded as a basis for penalties. Obviously, if penalties are to be exacted, the accuracy of measurement must be not only sufficient to act as a guide, but sufficient to ensure that no injustice is done. . . . It will be generally felt that the accuracy of illumination measurements does not compare with the accuracy of efficiency tests in electrical work; and, therefore, contractors may object to such measurements for the purpose of exacting penalties. On the other hand, unless penalties can be based upon specified measurements, it is difficult to see how the specification can be regarded as one that is 'standard,' and one which carries with it various legal obligations." We agree; and for the reason so well expressed by our contemporary as to the attitude of the minority. It also draws attention to another piece of looseness in the specification, to the effect that the illumination may be measured by (*a*) any suitable illumination photometer, and (*b*) by any suitable photometer measuring candle power, from which the illumination may then be calculated. The two means of measurement would not according to location give comparable results; and therefore there should not be choice in the selection of the means. If the "Electrician" were to ask its electrical friends which method they would adopt, we can see the wink and the smile that would accompany the answer in favour of "*a*," and of the auxiliary credits that local circumstances were kind enough to throw in. Of course, this "would merely be to the advantage of the lamps supplying the illumination, and would render it more easy to comply with the required minimum;" and therefore our contemporary cannot "consider that this particular objection is one that can be well supported." Perhaps it will be good enough to read its own article again.

The "Horrible Compound" and Munition Works Kitchens.

The Kaiser sets a very bad example to his enemies. When they happen to do anything that does not meet with his high barbaric ideals as to what constitutes legitimate warfare, he employs harsh language, which, however, does no harm. The "Electrical Times" writer of "Cooking and Heating Notes" is falling into this vicious habit. He says it is claimed by the gas people that the "horrible compound" they dispense is used as a matter of course to heat the cooking apparatus in kitchens attached to munition works. The sentence betrays a certain amount of anger; and it is not chivalrous. If we spoke of electricity as that "sneaky" current, or as the "invisible foe" that weekly sends men into the great unknown without warning, or without giving them an opportunity of escape by the use of any one of their senses, and that sets up conflagrations without even providing a preliminary cautionary smell, "Meteor" or someone else would be sure to fall upon us as though we had committed some unpardonable crime. But about the "horrible compound" that Nature has provided for the convenience of mankind, and which gives to the said mankind a heating agent rich in thermal value, and a few other things besides of remarkable use. Had it not been for this so-called "horrible compound," we are not sure whether there would have been an "Electrical Times" in existence now within which the little piece of puerile spite could have been printed and circulated. Certain it is the Central Powers would have had the conquest over us that the All Mightiest amiably designed. But what is the "horrible compound"? The writer of "Cooking and Heating Notes" would probably have to consult a text-book before he could reply, and then he would find that Nature had had no need to consult him in compounding gas in a manner to give it a very large utilitarian character for the purposes for which it is employed, for which purposes it has made a progress of no mean proportions, and with the more modern appliances will work a greater way still. The petty assaults of peevish writers and the 3420 B.Th.U. electrical unit (which requires so great a number of other B.Th.U. to give it birth) will do little to put the brake on to that progress. But the descriptive term is attached to a reference to cooking in munition works; and the writer asserts something that, if he is cognizant of the facts, he must know is a deliberate falsehood. He says the truth is that "electricity is adopted for cooking purposes in practically every case." It is a pity that he was not at Mr. H. M. Thornton's lecture at the Royal Society of Arts last April; for then, after seeing the series of photographic illustrations of munition works kitchens that was thrown on the screen, he would never have penned such a piece of absurdity. If he had seen the output of plant for munitions works from the works of all the gas-stove makers, or if he could inspect their books showing what they have been doing in this way, he would never have written a sentence that has ignorance and foolishness impressed upon every word of which it is constructed. A slight indication of what has been done can be seen by glancing through the volumes of the "Journal" for the past two years.

The One and Only Argument.

The same writer has something to say on "economy;" but he cannot get further than that beautifully stale fable regarding the "saving" of "meat" by electric cooking. The other phases of the subject are not worth notice—electrically speaking. In these war times we read, "economy is the watchword for the household; and the electric-cooker offers the best means for securing it." We have got into some awfully expensive muddles in this war through trusting to armchair politicians; and, even in the minor affairs of life, people are rather keen just now against being landed into any additional burdens through similar cause. Our electrical friend thinks that an "excellent opportunity now exists for station engineers to develop the sales of electric-cookers by impressing upon their consumers the savings that can be effected by electrifying their kitchens." Wit is part of the stock-in-trade of one of the members of the staff of our contemporary; but we hardly think he has anything to do with this particular section of the paper. In normal times, an electrical outfit for kitchen purposes is an expensive matter; in war times, much more so. Glancing through the news items of the electrical papers, we see frequent mention of cooking and heating prices now up to 2d. and more per unit. Truly, "an excellent opportunity for station engineers to develop the sales of electric-cookers." Station engineers know much better. Then we come to the kernel of the thing; and this is where economy is to be found—the discounts supplied by high installation costs and prices for current obviously being, in the view of this writer, negligible quantities. It is the inevitable *dernier ressort* of the electric cooking advocate. Here it is: "It has been proved beyond all question that the loss in weight of meat when cooked in an electric-oven is small compared with the waste that takes place with gas or coal cooking." That is to say, no matter how careless a person is with the electric-cooker, it is impossible to waste meat. If a high temperature is employed in an electric-cooker, and a low temperature in a gas-cooker, still the electric-cooker, with good conscience and intention, absolutely refuses to waste so much meat as the gas-range. That is the meaning of the fable, if it has any meaning at all. The electric-cooker cannot err; it declines to waste meat. If a 7½-lb. joint is purchased from the butcher, the electric-cooker will decline to put anything less than a 7-lb. cooked joint on the dinner table. It is very kind and very thoughtful of the electric-cooker. But will our friend answer the question we have put to him, or, if not to him, to others who have promulgated the same nonsense. Why is it, if equal temperatures are employed in electric and gas ovens, it is necessary to put a 9 to 10 lb. joint in a gas-oven and only a 7½-lb. one in an electric-oven to get 7 lbs. placed on the dining-table? We should like him to explain that; and, in doing so, we shall be obliged to him if he will not run off and hide behind the subterfuge that we have before experienced at the hands of electric cooking advocates. We have plenty of evidence as to the use of electric-cookers, as to their supersession by gas-cookers, and as to the thankfulness of users that they have got rid of a dilatory untrustworthy nuisance from their kitchens.

AN IMPROVED FLEXIBLE GAS-CONTAINER FOR VEHICLES.

A few weeks ago there was reproduced in the "JOURNAL" a photograph sent by Mr. Philip G. G. Moon, the Acting General Manager of the Bournemouth Gas and Water Company, of two of their motor-lorries which have been converted to the use of coal gas instead of petrol. Writing again on the subject, Mr. Moon remarks that, while these have been running fairly successfully, there are certain drawbacks attaching to the unwieldy floating gas-container—especially when this is partly deflated. Added to this, the bags the Company have been using are slightly porous, and there has been a considerable escape of gas, which not only results in loss, but is found to also cause a somewhat disagreeable smell as the lorry passes through the streets.

In fitting-up the third lorry, therefore, steps were taken which have been successful in overcoming most of these drawbacks. The general effect of the arrangement will be gathered from the illustration. The tray at the top of the lorry has been made 16 in. deep, and is rendered gas-tight by two layers of canvas stuck over the whole of the interior surface, and painted with successive coats of paint and shellac. Over the top of this gas-tight tray a sheet of good-quality rubbered canvas, quite impervious to gas, has been fastened, by means of slats all round the top of the tray, and shaped in such a way that it rises to a height of 18 in. above the tray-top.

An important point mentioned by Mr. Moon is that the cost of the canvas for this lorry was only about two-fifths as much as would have had to be spent upon a complete bag of similar capacity. On the other hand, the tray, of course, costs slightly more than the old shallow tray. The whole arrangement is, Mr. Moon says, so much neater, safer, and more effective in working, that he thinks it is well worth the consideration of any who may be contemplating converting their petrol lorries to coal gas.

Writing in the current issue on the general subject of the use of coal gas for motors, the "Ironmonger" says:

Complaints have been made by users of town gas for melting metal of variations in quality from day to day; and those who use gas for propulsive purposes are likely to encounter the same trouble, aggravated by the fact that the quality will vary to an even greater extent from district to district. If the gas companies are to reap the full benefit from this development, some improvement must be effected in the regularity of the quality of gas supplied. The man with gas-fired furnaces cannot remove to another town by way of protest; but the motorist will be free to obtain his supplies where he gets the best value for his money. Owing to the varying local conditions under which gas is made, it will not be possible to make the same quality throughout the country; but some approximation to uniformity is distinctly possible, while day-to-day variations in the same district ought to be largely eliminated by efficient works management. The potential custom of the motorist is not to be lightly ignored by the gas companies. There is no reason why some hundreds of thousands of light and heavy delivery vans should not be running in our principal towns within the next few years, using gas from flexible containers at atmospheric pressure. All that is required is a little intelligent publicity by the gas companies, and the provision of sufficient filling stations at convenient distances.

9000 CUBIC FEET OF GAS PER TON OF COAL.

By NORTON H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

NOT the least remarkable feature of the effect of war time conditions on the gas industry is the fact that gas engineers have repeatedly been asked to reverse established practice by going back to methods of procedure that were generally supposed to have been improved out of existence. The Government Committees step in and demand preferential consideration, and their requests from time to time are so conflicting (not to say contradictory) that one is under some perplexity as to the best course; and the well-known fable entitled "Old Man, Son, and Ass" acquires some additional signification.

That the bulk of the tar, and certainly the heavier portions, should be removed from all contact with the gas at the highest practicable temperature before the cooling is complete—say, at 90° or 100° Fahr.—has for years been an established axiom in the profession; but we are now advised to wash the gas freely with tar (the colder the better) or to subject it to a yet more rigorous oil treatment. We have known for some time that the greatest heating value for a ton of coal carbonized synchronized with the largest yield per ton that was consistent with the requirements of the official gas examiner. This may not be scientific; but it is business, and has satisfied both consumers and shareholders. It has been suggested that we should put the clock back fifty years, by returning to lower carbonizing temperatures and a make of 9000 c.ft. per ton, in order to improve the yield of tar. If there ever was a time when a low yield was profitable, it was when coal was cheap, and not when it is costing 30s. or more per ton.

The importance of making a pure sulphate that will show a 25 p.ct. ammonia content on testing has been repeatedly advanced; but we are told to use an impure residue in place of good acid, and thereby reduce the ammonia content to about 18 p.ct. Under present conditions of the labour, coal, and materials markets, it is indispensable to reasonable prices and profits that the sales should be maintained; yet gas undertakings were asked last year to add to the duties of their already overworked and depleted staffs a house-to-house canvass for the purpose of inducing people to use less gas. In each case, these innovations owe their introduction to a definite requirement, which may be the one thing needful to the Government, but cannot be so regarded from the gas-works' point of view, because a radical change may carry with it a number of unforeseen developments, which may prove to be favourable, unfavourable, or even disastrous, in a general way. Gas engineers are not deaf to claims of a patriotic or national character, as proved by the work they have done during the last three years. But they are expected to carry on with due consideration to the requirements of customers, many of whom are directly or indirectly concerned with Government work, and to the solvency of the undertaking for which they are responsible.

Experience in the tar market since the outbreak of war is not encouraging to an increased output of this residual, nor was it so for some time before. The Government require coal, rail, and shipping transport, metals, all kinds of materials, and labour; and, as a general rule, the result is that prices of such necessaries go up to unheard-of figures. One of their requirements is a very large supply of coal-tar; and the man in the street naturally supposes that gas companies are receiving anything up to 500 p.ct. of the normal prices. He is not aware that this case has proved the exception, and that during the earlier period of the war the market was glutted. Not only did the price fall to a nominal figure, from which it has only just begun to show signs of recovery, but some gas-works could not get stocks kept down to a comfortable limit at any price. Before entering upon a substantial advance in make, the gas industry needs to be assured that the experience of 1914-15 will not be repeated. Something has been said about subsidies; but a better inducement is a reasonably fair price, consistent with that of other raw material. Why should the gas undertakings be expected to sell at normal rates at a time when they cannot obtain any of their requirements under 100 to 200 p.ct. advance?

Profiteering is not confined to sellers; it may also take the form of obtaining goods at compulsory low prices.

Similar arguments apply, but in an inverse degree, to the consequent larger drafts on the supply of coal and labour. Gas undertakings are at present unable to obtain anything like adequate supplies of coal at the prices fixed by Government—and this in the light season; so the outlook for the ensuing winter is not promising. The same may be said about labour. So gas engineers may well pause to consider their position in respect to both these indispensable requirements before launching out on new schemes that, in the absence of special assistance, must inevitably accentuate the existing difficulties. They also want to know how the 9000 c.ft. quality will agree with the incandescent burner, even after most rigorous oil-washing. If turned direct on to a district accustomed to calorific standard gas, there will be complaints of sooted mantles and ceilings. One result of high-temperature carbonization is a reduction in the fuel account and a harder coke; and a return to old-time conditions will mean a reduction in the quantity of hard large coke available for sale. The deficiency must be covered by some other fuel, probably by coal.

These considerations are not advanced in a spirit of carping criticism, but as matters to which the gas engineer is expected to provide a satisfactory answer; and a little light may be thrown on the subject by a consideration of some results recorded by Mr. Lewis T. Wright, in a communication to the Society of Chemical Industry in 1888, and by the late Prof. Vivian B. Lewes, in his Cantor Lectures delivered in 1908.

TABLE I.—*Composition of Tars Obtained at Different Temperatures.*

Per Cent. by Weight.

Reference No.	I.	II.	III.	IV.	V.
Make of gas per ton	6,600	7,200	8,900	10,162	11,700
Tar, sp. gr.	1·086	1·102	1·140	1·154	1·206
Ammoniacal liquor	1·20	1·03	1·04	1·05	0·38
Crude naphtha	9·17	9·05	3·73	3·45	0·91
Light oil	10·50	7·46	4·47	2·59	0·57
Creosote oil	26·45	25·83	27·29	27·33	19·44
Anthracene oil	20·32	15·57	18·13	13·77	12·28
Pitch	28·89	36·80	41·80	47·67	64·08
Fixed carbon	8·69	11·92	13·53	—	24·67
Ammonia, lbs. per ton	—	6·30	7·50	7·89	7·41

Per Cent. by Volume.

Naphtha Total	10·96	10·73	4·59	4·27	1·31
Below 100°	0·85	1·15	1·00	0·75	0·38
,, 120°	0·82	0·97	1·10	0·79	0·54
,, 140°	2·52	2·01	0·89	0·90	0·27
,, 170°	3·10	2·74	1·02	0·86	0·24
Paraffins in	5·00	4·00	1·50	1·00	1·00
Tar acids	13	9	8	9	6
Light oils	11·70	8·41	5·23	3·01	0·69
Below 160°	0·41	0·21	0·14	0·11	0 14
,, 180°	1·76	1·14	1·36	0·58	0·15
Tar acids	34	34	29	31	22

Estimated Comparative Weight per Cent.—per Ton of Coal.

Ammoniacal liquor	·168	·134	·125	·115	·038
Crude naphtha	1·284	1·176	·448	·380	·091
Light oil	1·470	·970	·536	·285	·057
Creosote oil	3·703	3·358	3·275	3·006	1·944
Anthracene oil	2·845	2·024	2·175	1·515	1·228
Pitch	4·044	4·784	5·016	5·244	6·408
Loss	·486	·554	·425	·455	·234
	14·000	13·000	12·000	11·000	10·000

The figures shown in Table I. are abstracted from the official report of Mr. Wright's paper, which states that a fair quality gas coal was carbonized at five different temperatures, in a bed of seven through retorts, calculated to work off a charge of 2 cwt. per 9 ft. length in from five to eight hours. The retorts were 18 in. × 16 in. section, 18 ft. long; so it is evident that, according to modern notions, the charge was a light one, and therefore that the figures obtained in 1888 cannot be compared on all-fours with results recorded in 1917. The tests were made before the pusher mechanical charger and discharger had rendered the full retort a practical possibility. But this does affect their comparative value, one against the other. Assuming that the retorts were ⌂ section, the section area would be about 1¾ c.ft., and the cubical content of the empty retort 31½ c.ft. On the usual basis of 42 c.ft. per ton, the content of the charge would be 8·4 c.ft., or 26·6 p.ct., leaving 73·4 p.ct. of it unoccupied by the cold charge. But under the influence of heat, this would rapidly swell at least 50 p.ct.—say, to 13 c.ft., or 41·5 p.ct.—leaving a clear space above it of 18½ c.ft. The interstices in the cold charge would be soon filled by intumescence, and the gas would escape in quick puffs, without important contact with the red-hot charge. As compared with modern conditions, there would be shorter time contact with the coke, but a prolonged exposure to radiant and contact heat before reaching the ascension pipe. Assuming an outlet at each end, the average length of travel in the clear space would be 4½ c.ft.; and as at the makes stated the average evolution would be within the limits of 82½ and 234 c.ft. per hour, the average period of exposure would be one to three minutes. The maximum exposure time at the minimum temperature is less effective, so far as secondary reactions are concerned, than a minimum time at the maximum; showing that such actions depend more upon temperature than upon time. The conditions vary in all respects—travel, exposure, and temperature; and when we talk of a "high" or a "low" carbonizing temperature, it should be remembered that a large portion from the parts adjacent to the outlet, and during the earlier hours of the charge, before it has attained a maximum temperature, escape at a much lower heat. The total product, therefore, cannot be said to represent that at the maximum temperature, being mixed with low temperature substances. These probably constitute the heavier portions of the tar.

From Table I. the effect of varying temperatures on the composition of the tars may be summarized as follows: As the distillation temperature advances, the tar becomes heavier, due to the replacement of lighter constituents with fixed carbon and pitch, and a corresponding reduction in crude naphtha, light, and creosote oil. The make of creosote oil increases up to No. 4, but shows a sudden drop in No. 5. And this, together with other sudden changes, such as the increase of pitch on No. 5, as compared with No. 4, affords clear evidence of the existence of definite phases of secondary reactions at certain temperatures. Since they are attended with separation of carbon, the proportion present is some indication of the extent to which such actions have obtained.

From the writer's point of view, it is unfortunate that Mr. Wright does not refer to the make of gas or of tar per ton. Obviously, with a varying make, the percentage composition does not indicate the actual production per ton, which is the practical consideration. By taking an approximate estimate—say, in the proportion of 14, 13, 12, 11, and 10—we get a better idea of the total production [see the estimated comparative weight, as added to Table I.].

Some extracts from the results quoted by Prof. Lewes form the first eight lines of Table II., and the remainder is based thereon. To get a complete statement of the composition of the gas, it is necessary to add an estimated content of 6 p.ct. of carbon monoxide, and the balance is assumed to be incombustible matter. The symmetrical sequence of the figures indicates that they are approximate averages, based on a number of actual tests. The yields of tar quoted show a wider variation than is usual in practice. Small gas-works running without an exhauster do not sell 15 gallons of tar per ton of coal carbonized, and the production accompanying a make of 11,000 c.ft. or more usually exceeds 9 gallons.

The effects of increase in the distillation temperature on the composition of the gas are:

I.—A substantial and steady increase in the hydrogen.

II.—A similar decrease, but somewhat less in amount, of the methane.

III.—A steady decrease in the unsaturated hydrocarbons.

As reference to carbon monoxide is omitted, it may be concluded that the proportion of this compound is not affected to an important extent. All these have a marked effect on the heating value, the air requirement for complete combustion, and the total B.Th.U. per ton of coal carbonized—the steady advance in the last-named being particularly interesting, in these times when economy of heat is so prominent.

The prospects of reducing the composition of No. IX. to a passable resemblance of No. II. are not promising, keeping in view the desired increased production of tar; and the loss and expense incidental to such a process would scarcely be covered by the larger quantity and improved quality. By passing No. IX. through a superheater similar to that used in the water-gas process, and maintained at a temperature of 1652°, such a result might be secured; but it would mean increased consumption of fuel. The same applies to the dilution of a 621 B.Th.U. gas to 552 B.Th.U., by means of blue gas of 300 B.Th.U. About one-fourth of the diluent would be required, bringing the total product per ton up to 11,250 c.ft.

TABLE II.—*Composition of Gas at Different Distillation Temperatures.*

Reference No.	VI.	VII.	VIII.	IX.	X.	XI.
Temp. deg. Fahr.	752	932	1112	1292	1472	1652
C.ft. of gas per ton	5000	6400	7750	9000	10,000	11,000
Gallons of tar ,,	23	21	18	15	12	9
Sp. gr. of tar	1·060	1·087	1·115	1·140	1·170	1·200
Hydrogen	21·2	28·3	33·8	41·6	48·2	54·5
Methane	60·1	56·2	50·7	45·0	39·1	34·2
Heavy hydrocarbons	6·3	5·8	5·0	4·4	3·8	3·5
Carbon monoxide	6·0	6·0	6·0	6·0	6·0	6·0
Difference	6·4	3·7	4·5	3·0	2·9	1·8
	100·0	100·0	100·0	100·0	100·0	100·0
B.Th.U. per c.ft.	714	696	656	621	582	552
Air requirement	8·04	7·62	7·02	6·52	6·04	5·68

Total B.Th.U. per Ton of Coal.

No. VI.	35,713,950	No. VIII.	55,930,140
No. VII.	44,566,848	No. IX.	58,188,900
No. VIII.	50,830,467	No. X.	60,072,090

There would be a small increase on the total yield of gas, but an increased fuel account. A comparison of the heating value and air requirement of each constituent affords useful information, as shown by Table III.

TABLE III.—*Calorific Values.*

—	VI.	VII.	VIII.	IX.	X.	XI.
Hydrogen . .	6805·2	9084·3	10849·8	13353·6	15472·2	17494·5
Methane . .	61121·7	57155·4	51561·9	45765·0	39764·7	34781·4
Heavy hydrocarbons . .	1575·0	1450·0	1250·0	1100·0	1026·0	980·0
Carbon monoxide . .	1926·0	1926·0	1926·0	1926·0	1926·0	1926·0
Per cubic foot. .	714·279	696·157	655·877	621·446	581·889	551·819

Air Requirement per Cubic Foot.

Hydrogen . . .	50·46	67·35	80·44	99·01	114·70	129·71
Methane	582·15	535·03	482·67	428·40	372·23	325·58
Heavy hydrocarbons	157·50	145·00	125·00	110·00	102·60	98·00
Carbon monoxide .	14·28	14 28	14·28	14·28	14·28	14·28
Total	8·0439	7·616	7·023	6·517	6·038	5·676

The steady decrease in air requirement corresponds with the reduction in methane, which in No. VI. accounts for no less than 85 p.ct. of the total, and the minimum requirement, in No. XI. is over 60 p.ct. The heavy hydrocarbons have also a marked effect on the total, as compared with their small percentage proportion. This is due to their extensive oxygen requirements. Their calorific value, in all cases, constitutes a considerable proportion of the total.

LOW-TEMPERATURE DISTILLATION OF INFERIOR COALS.

By T. F. WINMILL, B.A., B.Sc., Research Chemist of the Staveley Coal and Iron Company.

[**A Communication to the "Journal of the Society of Chemical Industry."**]

Accompanying the main coal seams in some parts of England are often found seams of inferior coal substances, which with different composition and in different districts receive different names—such as "Jacks," "Branch Coal," "Bastard Cannel." As the last name implies, these coals have often some resemblance to a cannel coal; but the resemblance is not very close. They are all distinguished by their high ash content, and the very voluminous nature of the ash, making them useless for ordinary fuel purposes. Jacks and black shale may leave 80 p.ct. of ash when burnt; while a very good sample of bastard cannel may leave only 10 p.ct. In some districts the bastard cannel is fairly uniform in composition over a wide area and contains generally from 20 to 30 p.ct. of ash. The associated carbonaceous matter is intermediate in composition between a "soft" coal and a cannel, as is shown by the following limiting analyses, calculated on a dry, ash-free basis:

	Per Cent.
Carbon	78·0 to 81·0
Hydrogen	5·7 ,, 6·0
Nitrogen	1·2 ,, 1·5
Sulphur	1·5 ,, 5·0
Oxygen	10·0 ,, 10·5

From these figures it is clear that the substance contains a large amount of potential energy, which is at present wasted. The carbonaceous portion is comparable in composition to that of a good coal; so that in effect every 100 tons of branch or bastard cannel coal contains as much heat value as 70 to 80 tons of high-grade coal. Experiments have, therefore, been made to see whether any portion of this potential energy can be rendered available in the form of oil fuel or other valuable products.

Of recent years much attention has been given to the destructive distillation of coal at low temperatures, and many accounts have been published of the results of such distillations. In general, it is claimed that very large yields of tar and ammonia are obtained by this method—much larger than those from coke-ovens or gas-retorts; and, further, that the tars on re-distillation yield useful oils of different grades, some sufficiently volatile to replace petrol as a motor spirit. Such a process seemed, therefore, admirably suited for extracting the greatest possible quantity of valuable products from the branch coal. As the sequel shows, expectations of a large yield of oils have not been realized; and no workable quantity of volatile oils corresponding to petrol was recovered, despite the fact that a cannel coal should, on the showing of previous publications, have been the most favourable substance to work with.

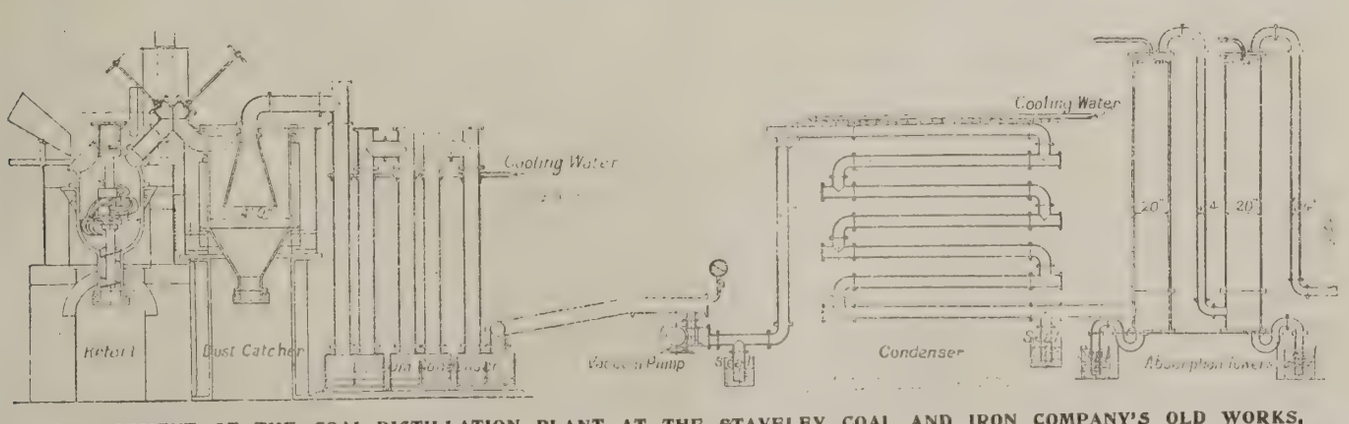
Apparatus.—In designing the apparatus for the distillation, it had to be borne in mind that the coke residuum would in any case be valueless, as its ash content would be above 50 p.ct. The aim of the design, therefore, had to be to secure the most rapid coking, with the biggest possible yield of bye-products, without considering the effect on the residuum. The retort was made of cast iron, 2 in. thick, built into a fire-brick chamber, and heated by five evenly-placed bunsen burners. It held a charge of 8 cwt. of coal, and was fitted with a very efficient stirrer that worked through a vacuum-tight stuffing-box. The stirrer quickly ground up the charge, and brought fresh portions of it continually against the hot walls of the retort—thus securing a rapid heating throughout the mass, instead of depending on the slow conduction of heat usual in any other coking oven. The distillation was carried out under a vacuum of from 26 to 28 in. of mercury, and had gone as far as it would at 500° C. in 3½ hours, after which the contents of the retort could be discharged by opening the bottom door and reversing the direction of revolution of the stirrer.

While effecting such a marked shortening in the time of coking, the stirrer introduced experimental difficulties which at first gave much trouble. Part of the charge was, by the combined action of the stirrer and the effect of the temperature, quickly reduced to a fine dust, which was carried out of the retort—blocking the ascension pipes and the condensers. To reduce this to a minimum, the speed of the stirrer was reduced from three revolutions per minute to two revolutions in three minutes. But even at this speed the condensers soon became choked, until a dust-catcher and other appliances for dealing with the dust were introduced. An interesting, though very objectionable, property of the dust was its extreme liability to spontaneous combustion. A few pounds of it removed from the ascension pipe (even when absolutely cold) would, by the absorption of oxygen from the air and the consequent spontaneous generation of heat, burst into flame within about half-an-hour. The exclusion of oxygen from the dust, of course, prevents this firing.

The other details of the apparatus need no special remark, and are quite clear from the illustration drawn by Mr. F. Smith, for whose assistance in the arrangement, building, and working of the plant the writer wishes to tender his best thanks.

Method of Working.—The retort was brought to a temperature between 500° and 550° C.; the stirrer started; and a charge of 8 cwt. of coal introduced from a hopper. The retort-door was then closed, and the valve leading to the vacuum pump opened. The whole charging operations occupied less than five minutes. The vacuum and a temperature of 500° C. were maintained for 3½ hours, at the end of which time experience showed that practically no more oils or gases were being evolved. The vacuum valve was then closed, and air admitted to the retort through a ½-in. pipe from the bottom of the charge. The bottom door of the retort was then opened; the direction of revolution of the stirrer reversed; and the carbonized residue discharged from the retort in the space of a few minutes. The collected tar was then run off from the condensers, after which the apparatus was ready for another charge. The complete series of operations, from the introduction of one charge to the introduction of the next, occupied slightly less than four hours; so that a plant of the size described would be capable of dealing with nearly 2½ tons of coal per day of twenty-four hours.

Distillation Products.—The distillation produced: (1) tar and



ARRANGEMENT OF THE COAL-DISTILLATION PLANT AT THE STAVELEY COAL AND IRON COMPANY'S OLD WORKS.

aqueous liquor condensed *in vacuo*; (2) gas which passes through the vacuum pump and was in part burnt under the retort.

Treatment of Tar.—The vacuum tar was quite fluid when warm; but on cooling it became as viscous as ordinary coke-oven tar. It has a characteristic and not unpleasant odour, quite unlike that of the latter. About 30 gallons was produced per ton of coal distilled. Its separation from the admixed water is very difficult; and nothing approaching a complete separation of the two could be obtained by "settling," or by reheating and settling.

On re-distillation, it undergoes decomposition even at temperatures as low as 150° C., depositing carbon and evolving hydrogen, sulphuretted hydrogen, and ammonia—the two latter gases probably coming from the admixed water, which in addition causes much frothing. Distillations were carried out both at ordinary pressure and under vacuum, but the products of the two distillations did not differ materially. The residue in the still consisted of a hard pitch which had to be chipped out. The distillate was a very dark-coloured oil containing suspended carbon, apparently formed partly by the thermal decomposition of the original tar and partly by oxidation of the cold oil. In this state, chemical treatment of the oil was difficult; and it was, therefore, subjected to further distillation, when it left as a residue a semi-solid mass containing much free carbon, and furnished a distillate which was at first colourless, quickly becoming red, and finally (within a day) black. This behaviour was not confined to any one fraction—all the distillates between 150° and 360° C. appearing to discolour with equal rapidity. The various fractions were then treated with 10 p.ct. caustic soda solution. All the fractions yielded a soluble portion, varying in amount. Thus, for example, the oil distilling up to 180° C. yielded 18 p.ct.; that between 200° and 220° C., 47 p.ct.; while that between 330° and 360° C. yielded only 21 p.ct. soluble in the soda solution. Of the whole distillate, 33 p.ct. was dissolved. The remaining 67 p.ct., on re-distillation, gave a colourless oil which soon blackened again. Treatment with successive portions of strong sulphuric acid finally gave an oil which, on distillation, remained colourless or only very slightly yellow.

The part of the oil soluble in caustic soda consisted of a complex mixture of phenolic substances, but contained practically no phenol (carbolic acid). The simplest phenols present were the three cresols, and these were mixed with higher homologues and phenolic ethers containing non-esterified hydroxyl groups. The whole mixture can only find very limited uses, similar to those of coal-tar creosote.

The fraction soluble in sulphuric acid consisted of a mixture of neutral phenolic ethers together with some hydrocarbons. The quantitative results per ton of coal distilled were:

Pitch	100 lbs.
Semi-solid wax	50 lbs.
Soda-soluble oil	4 gallons.
Phenolic ethers, extracted by sulphuric acid	1·5 gallons.
Hydrocarbon oil	6·5 gallons.

The finally purified hydrocarbon oil formed the main bulk of the liquid products. It consists of a mixture of unsaturated and polymethylene hydrocarbons, from which no chemical individual could be easily separated. The mixture has a characteristic and not unpleasant odour. It starts to boil at 150° C., and continues to distil in fractions of fairly equal volumes for equal temperature rises up to 360° C., above which point about 5 p.ct. of the total remains unvolatilized. The various fractions range in density from ·794 to ·910 at 15° C. No benzenoid hydrocarbons are present; and no commercially valuable compound can be isolated from the mixture. Even the higher boiling point oils are mobile liquids, and possess neither sufficient viscosity nor "body" for use as lubricants. The only obvious use for the mixture is as a fuel oil.

Ammonia Production.—The bulk of the ammonia formed was contained in the condensed aqueous liquor, and was equivalent to about 25 lbs. of ammonium sulphate per ton of coal. A further quantity of 10 to 15 lbs. can be extracted from the gas leaving the condensers, giving a total yield of 35 to 40 lbs. of ammonium sulphate per ton of coal.

Gas.—The gas coming from the condensers is very similar in composition to ordinary coal gas, and contains very little extractable light oil. Some oil is carried mechanically with the gas, but no appreciable quantity of oil boiling below 150° C. could be obtained, either by condensation or by washing. About 6000 c.ft. of gas was produced per ton of coal distilled.

Conclusions.—The experiments described show definitely that low-temperature distillation of a high-ash waste coal is not a commercially economical process. The initial low cost of the waste coal would, at first sight, seem to make it possible to work on comparatively small yields of bye-products. It must not be forgotten, however, that in ordinary coking practice the price obtained for the coke made, as a rule, more than pays for the slack from which it is made; and hence, in the absence of coke from the waste fuels, the apparent advantage of worthless coals more than disappears, and the whole costs of the process have to be defrayed by the increased value of the bye-products. In previously published accounts, the quantity and nature of these products claimed have been sufficient to pay for the process; but in the light of the experiments now described it would appear that these have been estimated much too optimistically. The saleable products amount to 6 gallons of oil, 35 to 40 lbs. of ammonium sulphate, and perhaps 2000 to 3000 c.ft. of gas, after allowing for that necessary for the distillation.

The value of the oil is difficult to estimate, as it is of a new type. It would seem to have little value except as a fuel oil, and for that purpose need not perhaps be so highly purified. Unless fairly complete purification is made, however, the oil will resinify and become of much less utility. The cost of complete purification is considerable. The phenolic substances which it is desired to remove are not very readily soluble in soda—being much weaker acids than carbolic acid; and hence it is the partition coefficient between the oil layer and the soda layer is so large that a considerable number of washings with comparatively large volumes of soda solution are necessary. In practice, it is found that a total volume of 10 p.ct. soda solution equal to the volume of the oil washed, is necessary for the complete removal of the phenolic bodies. The cost of these washings, added to that of the distillations, would make it impossible to produce the refined oil at a profit in normal times. As a fuel, however, the crude unwashed oil might find a market; but in this state it could only compete with coal tar creosotes, for which the uses are limited and the price low.

It was thought that possibly by cracking the oil, benzenoid compounds might be obtained in sufficient quantity to make the distillation profitable; but small-scale experiments, in which the oil vapours were passed over coke at 800° C., gave no encouragement for larger experiments.

It must be concluded, therefore, that low-temperature distillation cannot be made to pay on the value of the bye-products alone, and hence is useless as a means of utilizing waste fuels of high ash content. The process as applied to valuable coals is in a somewhat different position; for in this case a residue of "smokeless" fuel is obtained. At present, it cannot be claimed that there is any very large market for such fuel in competition with coal itself; but what market may be created in the future it is impossible to estimate. Any legislation in favour of smoke abatement would of course give a great impetus to the use of semi-carbonized fuels, since most boilers, and all domestic fireplaces, are not designed to burn ordinary coke, whereas the semi-carbonized fuels obtained by the low-temperature distillation of coal can often be burnt more or less successfully in existing apparatus. But they would then find a severe competitor in gas-firing. Unless such measures are taken, however, the ease with which a coal fire can be maintained, and the smaller proportion of ash in a good coal (for by carbonizing the proportion of ash in the residuum is made nearly double that in the coal from which it is produced), will severely handicap the extended use of smokeless fuel.

Welding Tool Steel on to Soft Steel by Gas.

Until recently, says Mr. Charles E. Richardson, of the Surface Combustion Company (N.Y.), writing in the "American Gas Engineering Journal," welding has been considered impossible in furnaces with town gas; but on careful investigation it was found that the causes of failure could be avoided. He describes a furnace which has been installed in connection with the production of machine knives for rotary cutters of wood-working and similar machines. The finished knives consist of a slab of soft steel, with a thin layer of tool steel welded on one face. The furnace is made up of two working chambers, with a pre-heating chamber between. The former chambers can be used separately or together; and the flue gases from them pass into the pre-heating chamber and out at the rear. The working chambers are maintained at a temperature of between 2700° and 2800° Fahr., which yields a temperature of approximately 1800° Fahr. in the pre-heating chamber. Surface combustion high-pressure burners and control devices are used. Often several re-heats are necessary to complete the welding and rolling to size; and because of this it is impossible to state definitely the efficiency of the furnace. It is, however, said that 1700 lbs. of work is handled in nine hours, on a consumption of 12,700 c.ft. of 580 B.Th.U. gas. Mr. Richardson remarks that these figures by no means represent the capacity of the furnace, but give an indication of the consumption of gas per ton of welded stock. It is possible to at least treble the tonnage shown by this test. It is felt that this installation, which has been in operation for several months, thoroughly demonstrates the availability of gas for welding work, and that a heretofore untouched field is now open to the gas industry.

Junior Institution of Engineers' Cadets.—The Junior Institution of Engineers have instituted a "Cadet Associate Membership," whereby engineering pupils in works or college (day or evening students) may be registered for a nominal yearly fee of 5s. It is open to youths of fifteen years and over who are still undergoing training, and who, as certified by a principal of a technical college or head of department of an engineering works, are making satisfactory progress in the development of their abilities as engineer-pupils. The registration as a cadet associate member of the Institution is for one year only; and renewals can only be accepted when satisfactory progress and development are vouched for by a responsible authority under whom the applicant is serving. The Institution undertake certain duties in regard to these cadets, which are set forth in a pamphlet that may be obtained upon application to the Secretary, at No. 39, Victoria Street, Westminster, S.W. 1. The project is commendable; and no doubt the scheme will be pushed with vigour and enthusiasm in the interests of the profession and of patriotism.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Glasgow, Friday, Sept. 7.

The Fifty-Sixth Annual General Meeting of the North British Association of Gas Managers was held on Friday, in the hall of the Philosophical Society, Bath Street, Glasgow. Mr. JOHN LANG, Gas Engineer, of Alexandria (the President), occupied the chair, and was supported by Mr. Alexander Masterton (Edinburgh), Mr. Robert Muir (Galston), the Vice-President, and Mr. P. B. Watson (Wishaw), the Secretary. Upwards of ninety members were present.

INTRODUCTORY.

The PRESIDENT, at the outset, expressed his pleasure at seeing such a representative attendance.

The minutes of the last annual general meeting were read and duly approved.

APOLOGIES FOR ABSENCE.

The SECRETARY submitted apologies for absence from Messrs. Doig Gibb (London), George Clark (Chesterfield), Alexander Yuill (Dundee), John Terrace (Grimsby), and George R. Hislop (Paisley).

COUNCIL'S ANNUAL REPORT.

The PRESIDENT said that copies of the Council's annual report had been distributed among the members. He had no doubt that the report had been carefully studied; he would merely formally move its adoption.

The Council, in their report, stated that the membership of the Association at June 30 was 251, as compared with 258 at the close of the previous year. There are 158 ordinary members, 10 associate members, 76 extraordinary members, and 7 honorary members. Intimation was made of the death of three ordinary members (Messrs. William Ewing, of Magherafelt, J. N. Myers, of Saltcoats, and William Smith, of Ayr), and two extraordinary members (Messrs. Archibald Mackay, of Edinburgh, and R. M. Sutherand, of Falkirk).

NEW MEMBERS.

The following were recommended for membership:

Ordinary Members.—Messrs. J. K. Simmons, of Moffat; James Kirk, of Auchterarder; W. Erskine, of Biggar; R. B. Waddell, of Polmont; T. M'Dougall, of Banff; A. Mackie, of Alva; A. Currie, of Campbeltown; W. Dunlop, of Cardenden; G. P. Wilson, of Banchory; and Jas. Dickson, of Kirkintilloch.

Extraordinary Members.—Messrs. F. Ellison, of Cleckheaton; A. Young, of Edinburgh; J. H. Bennet, of Edinburgh; Kenneth Aird, of Falkirk; F. J. West, of Manchester; J. G. Galloway, of Leith; and J. Brown, of Falkirk.

Transferred from Associate to Ordinary Membership.—Messrs. T. Carmichael, of Nottingham, and G. Braidwood, of Coatbridge.

Mr. John Lang, of Alexandria, has been appointed to represent the Association on the Council of the Institution of Gas Engineers for the year 1917-1918.

COMMERCIAL SECTIONS.

(1) *Western District.*—The meetings of the Western District throughout the year have been characterized by great vigour; and the usefulness of the section to the members has never been more pronounced. Despite the many difficulties brought about by the continuance of the war, and perhaps because of these difficulties, the attendances at the meetings were exceptionally good. The subjects discussed ranged over a wide field, interesting and informative to the members. The number of members is 47, the same as last year. During the year, Mr. James Bell, on being appointed Gas Engineer to the Town Council of Dumbarton, resigned the Honorary Secretaryship of the Association. The resignation was accepted with regret; and the members' appreciation of the very valuable services rendered to the section by Mr. Bell was recorded in the minutes. Mr. F. W. Carlow, of Renton, presided over the meetings, with much acceptance to the members (David Fulton, *Hon. Secretary and Treasurer*).

(2) *North Eastern District.*—During the past year there have been six meetings. The new orders by the Coal Controller, restricting the area of supply of coal, is causing a great deal of anxiety to many gas managers; and strong efforts will have to be made in order that a continuance of the present arrangements may be obtained. This is a matter which might well be taken up by the Association, also the question of sulphuric acid and sulphate of ammonia, seeing that the whole gas industry is affected (R. S. Johnstone, *Secretary*).

BENEVOLENT FUND.

During the financial year no applications for assistance from the fund were received. The amount at the credit of the fund is £773 19s.

NATIONAL GAS-TESTING LABORATORY FOR SCOTLAND.

The Council desire to report that, after making careful inquiry of qualified chemists in Glasgow and Edinburgh, and submitting to each of them a schedule of materials used in gas-works, and of which analysis may be required, the Council unanimously recommend that Mr. G. H. Gemmel, of No. 4, Lindsay Place, George IV. Bridge, Edinburgh, be appointed Official Analyst to the North British Association of Gas Managers for the ensuing year, with a retaining fee of ten guineas; this sum to be paid from the Research Fund of the Association. A printed schedule of costs of analysis will be posted to each member in charge of gas-works.

Mr. LAURENCE HISLOP (Uddingston) seconded the motion.

Mr. J. D. KEILLOR (Hawick) said it was surprising that there should have been a rather conspicuous omission from the report. This was the movement on foot for the reconstruction and development of the country's industrial organizations. Since the report exhibited no interest on the part of the Council in this matter, he desired to know what the attitude of the Council really was.

The PRESIDENT observed that the proposal for the formation of a Scottish Gas Council was a subject which would fall to be discussed that day. He presumed that it was a question of this kind relating to the gas industry that Mr. Keillor was referring to.

Mr. KEILLOR explained that he was not referring particularly to movements which applied to Scotland alone. He had in his mind such movements as were intended to reconstruct and reorganize the gas industry generally. Was he right in assuming that the matters mentioned in the *agenda* as coming before them for discussion that day embraced to the fullest extent the Council's interest on industrial reconstruction?

The PRESIDENT pointed out that the proposal for the establishment of a Scottish Gas Council had been discussed by the Council of the Association; and it was placed on the *agenda* solely with the object of giving the members an opportunity of expressing their opinions. It would be observed from the report that reference was made to the establishment of a national gas-testing laboratory for Scotland. The Council had recommended the appointment of Mr. G. H. Gemmel, of No. 4, Lindsay Place, George IV. Bridge, Edinburgh, as Analyst to the Association. Their belief was that the step they were taking would be justified by experience; and he hoped the members would take the fullest advantage of the facilities which had been provided for them. Mr. Gemmel had prepared, for the information of the members, a statement setting forth the principal materials used and produced in gas-works—of which analyses might at any time be required—and accompanying the statement was a note of the fees which would be charged. Since Mr. Gemmel was present, the meeting might wish to hear a few remarks from him.

Mr. G. H. GEMMEL (who was cordially received) remarked that the Association, in proposing to appoint an Official Chemist, was taking a very important step. If the idea was carried through, he had no hesitation in saying that the results would in every way justify the experiment. Nowadays every manufacturer ought to know the composition and strength of the materials he bought and sold. They could not afford to purchase material on the terms stated; they must be able to specifically check the guarantee given. They were quite well aware that, in selling sulphate of ammonia, it was possible for them to secure a higher price if they were in a position to improve the strength. It was only, then, by a comparison of results from time to time that they could improve the strength of sulphate of ammonia. Many of the materials they had to deal with in gas-works were well known, and, if he might use the term, standardized. In the case of fire-bricks, they knew generally the nature of their composition; and on this account, analysis was not quite so necessary there. The same applied to coals which were in common use. It was only when new seams were opened-out, and new qualities of coal put on the market, that analysis was desirable to test their suitability for gas-works. On the other hand, there were materials—such as lubricating oils, paints, cements, &c.—on which a close eye should at all times be kept. Further, the mere fact that members of the Association were testing and analyzing the materials supplied to them was sufficient to guarantee to a considerable extent that what was ordered would be supplied. The other day, the Secretary of one of the railway companies in Scotland, for whom he had done work for a number of years, said he was quite satisfied that the fee they paid was money well expended. It ensured that the oils, paints, white lead, &c., supplied were fully up to the standard contracted for. His (the speaker's) business was principally that of an analytical chemist and not a manufacturing chemist. Generally speaking, he had a practical knowledge of gas manufacture; and because of his connection with many other industries, he might be said to bring to his work a wider outlook than was possible only for the specialist in gas chemistry. Many problems lay in front of the gas industry; and if they agreed to his appointment as Official Analyst, he would endeavour to assist them in their many difficulties so far as his experience and judgment permitted him.

A vote of thanks was passed to Mr. Gemmel for his attendance and remarks.

The report of the Council was agreed to.

THE NEW SUBSCRIPTION RATES.

The PRESIDENT said that, in accordance with a recommendation of the Council, he was now prepared to move:

> That the members' annual subscriptions be increased as follows: (1) That all extraordinary members and members in gas-works making 20 million c.ft. per annum and upwards should be increased by 5s. per annum; (2) that all associate members and ordinary members in gas-works making under 20 million c.ft. per annum should be increased by 2s. 6d. per annum.

Speaking in support of the resolution, he said it would be noticed, from a perusal of the accounts, that the expenses for printing and stationery had risen considerably during the past few years. As a matter of fact, their costs in that connection last year were in excess of the preceding year to the extent of £25. Indeed, had it not been for the large number of extraordinary members they were successful in adding last year, they would have found themselves in a very bad way. It was anticipated that the increase in the subscriptions now asked for would bring in an additional sum of £50; and this amount it was hoped would cover the extra outlay. There was no sign of the war finishing; and they did not know to what extent costs would still

rise. The Council had delayed taking this step as long as they possibly could. The increase in the subscriptions was necessary; and he hoped the members would see the reasonableness of the proposal that was now put forward.

Mr. W. WILLIAMSON (Forres) said he believed he drew the attention of the members to the financial position of the Association at the meeting in Edinburgh a year ago. At that meeting the then President (Mr. Alex. Masterton) regarded the accounts as quite satisfactory. The truth of the matter was that the Council ought to have looked into this question of the finances six years ago. In 1910, the Association received a sum of £95 as subsriptions from extraordinary members. This sum had been entirely absorbed in meeting current expenditure. When the constitution was changed, it was thought that the Association might be able to keep solvent as a result of the subscriptions that were received from extraordinary members. Unfortunately, they still continued to find themselves on the wrong side, notwithstanding the fact that in the interval there had been received as subscriptions from extraordinary members something like £200. As an amendment to the proposal of the Council, he was prepared to move that the following increase in the subscriptions should be agreed to:

> 2s. 6d. for members and associate members in works making up to 10 million c.ft. per annum; 5s. in works manufacturing from 10 to 20 millions per annum; and 7s. 6d. in works of 20 to 40 millions per annum; and 10s. in works where the manufacture of gas exceeded 40 millions per annum.

He was not disposed to ask the extraordinary members to pay anything more than they presently did to the funds of the Association; but he held to the view that the subscriptions received from such members ought to be paid into the benevolent fund. This money ought not to be placed to the credit of the general fund at all, because it consisted of extraordinary, and not ordinary, subscriptions.

Mr. DAVID VASS (Perth), while seconding the motion made by the President on behalf of the Council, conceded that there might be something in the arguments put forward by Mr. Williamson.

Mr. D. ROBERTSON (Dunoon) expressed the view that the members ought to be very cautious before taking the course it was contemplated in increasing the subscriptions. It was to be borne in mind that they were living in extraordinary times; and it would be rather a pity if they should increase the subscriptions and find, before long, that the income was much in excess of the actual requirements. A great part of the increased expenditure could be traced to the additional charges for printing and stationery. But the present was a somewhat exceptional period; and it was never expected that the prevailing high rates for printing and stationery would continue after the war. In the circumstances, he thought that they should try and keep things going for another year or so without making the increases that were proposed. He was prepared to move an amendment to this effect.

The PRESIDENT said that, arising out of the observations made by Mr. Robertson, he might explain that the Council had seriously considered the financial position of the Association for the past three years. They had always been averse to making the change; but now it was forced upon them. They never anticipated that the war would last so long as it had done. It had come to be generally recognized now that, even after the war was over, a year or two must elapse ere prices could return to the normal.

Mr. J. M'DONALD (Denny) seconded Mr. Robertson's amendment; and there being no seconder for the amendment suggested by Mr. Williamson, it dropped.

On a division, the recommendation of the Council was carried by a very large majority.

AID IN EXPLOSIVES PRODUCTION.

The SECRETARY read the following letter which had been received from Lord Moulton:

> *Ministry of Munitions of War,*
> *Department of Explosives Supply,*
> *Storey's Gate, Westminster, S.W.,*
> *Sept. 5, 1917.*
>
> Dear Sir,—I am directed by Lord Moulton to acknowledge your letter of Aug. 23. His Lordship sends his best wishes to the North British Association of Gas Managers, and trusts that their annual meeting will be a great success.
>
> The gas industries of the country have rendered such inestimable service to this Department in providing the raw materials for explosives, that he feels very grateful to them; and if the needs of the country get greater or differ in this respect, he will come to them in confidence for their aid in future.—Yours faithfully,
>
> J. BAZIRE.

On the suggestion of Mr. LAURENCE HISLOP, the Secretary was instructed to acknowledge the courteous letter from Lord Moulton, and to assure him that the members would do what they possibly could to assist him in his work.

APPEAL FROM THE MINISTRY OF MUNITIONS.

It was intimated that a letter had been received from Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, drawing attention to the recent announcement issued by the Ministry of Munitions requesting all gas undertakings to carbonize as much coal as possible, in order that the maximum yield of the products needed in the prosecution of the war might be adequately supplied. The letter explained that the Institution had undertaken to communicate with the District Associations, asking each of them to bring this important announcement under the notice of members. The hope was expressed that each undertaking would respond in the same patriotic spirit as had been shown in answer to other calls on the gas industry.

Mr. DAVID VASS (Perth) felt sure they were all at one in their endeavour to increase the output of gas; but the drawback appeared to lie in the fact that certain of the Government Departments were rather hindering them in their work in this connection. The difficulty he specially referred to was that associated with the granting of permits for materials.

It seemed to him as if this was a difficulty which was going to be aggravated in the future. If, then, the North British Association gave expression to its willingness to increase and accelerate the output as much as possible, it was natural to expect corresponding assistance and support from the Government Departments in the carrying on of the work.

The PRESIDENT remarked that they were all agreed in the expression of opinion given by Mr. Vass. The trouble was that things at the present moment appeared, in a sense, to be altogether upside down. If the Government Departments were really desirous that gas managers should do what they could to increase the output of gas, then they must be ready with the facilities to enable the work to be pushed forward. He took it that the latter was a *quid pro quo*, which was quite well understood by all gas managers in these days.

The subject was at this point allowed to drop.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then read the following address:

Gentlemen,—Last year when you honoured me by appointing me your President I hoped that, when the time came for this meeting to be held, the great war which has now been going on for three years would have ended. Since then the Allies have pushed back the armies of the Central Powers, and our position has been made stronger by America joining in with us. But still Peace seems a long way off.

To-day we meet under abnormal conditions—conditions which had anyone had the temerity to prophesy four years ago, he would have been laughed to scorn. But, who knows what we may yet see?

The gas industry during this period has had a very heavy burden to bear. What with the call for men for the army, the substitution of women, the extraction of benzol and toluol, the price and shortage of coal, &c., these are only a few of the troubles which the management have had to bear; and the manner in which these troubles have been borne and met speaks volumes for the organization of the industry, and the men who have had charge of the different works.

It was with great pleasure I read the remarks of Lord Moulton on his appointment as President of the Institution of Gas Engineers, in which he stated how much the country was indebted to the gas industry for having supplied the means of defence, and how he appreciated the work that had been done. We all like to find that the work we have been doing is appreciated; and no one is in a better position to know what the industry has done than Lord Moulton. Therefore, with this tribute coming from him, we feel our work is recognized; and in the midst of our troubles we take heart again, and try to keep going on. I think it would be well if more publicity were given to Lord Moulton's remarks, as it would give consumers, &c., a better idea of what is really being done by the industry.

ASSOCIATION'S LOSSES BY DEATH.

At this point, I should like to refer to the losses the Association has sustained by death since we last met. Mr. William Ewing, a Past-President of our Association, was well known to you all; but for some time past the scenes of his activities were removed from amongst us. Mr. J. Napier Myers, of Saltcoats, took a very active interest in all things connected with the Association, and was a regular attendant at our meetings. Mr. W. Smith, of Ayr, was one of our oldest members. He retired from the position of Manager of the Ayr Gas-Works in 1908. Mr. R. M. Sutherland, of Falkirk (one of our extraordinary members), took very great interest in our Association, and often joined in our discussions. Mr. Arch. Mackay, of Edinburgh (also an extraordinary member), was well known to most of our members. We very much regret the loss of these gentlemen.

EXTENDED USE OF GAS.

Owing to the erection of munition works in many parts of the country, the demand for gas has greatly increased in these places. Many people who had prejudices against gas have had to use it; and I hope in most cases have been converted, and now appreciate its value for heating and furnace work, &c. This has been a great opportunity for the industry to show what it could do; and I feel certain that most of those who perforce had to use gas will, after their experience, continue to do so, provided the price is at all reasonable.

After the war is over many changes may occur. But I think we shall continue to extract the light oils from the gas, which at present are being used for explosives, and in the future may be used for the manufacture of dyes, &c., also as a motor spirit. The gas, I think, will be of even a lower calorific value than the present 500 B.Th.U. standard; and I am hopeful that the investigations which are now going on may bring to light the gas which can be most economically produced—having the most suitable flame temperature for incandescent lighting, heating, and furnace work. Once the quality or value of the gas is decided upon, the manufacturers, I am sure, will make their burners, furnaces, fires, &c., to suit the quality.

We see at the present time what we are able to do with the light oils extracted from the gas; so that after the war, with coal at a reasonable price, and receiving a fair return for our residuals—including the light oils—I have no doubt we should be able to sell gas for fuel purposes at a rate low enough to retain the business we at present have. It behoves us to see that we not only retain it, but increase it.

VALE OF LEVEN GAS COMPANY.

When war broke out in 1914, the Argyll Motor Company were in liquidation; and their splendidly equipped works at Alexandria

were doing very little. When the demand for works for the manufacture of shells, &c., came on, Messrs. Sir W. G. Armstrong, Whitworth, & Co., took over the works for this purpose, with the result that the output of gas from the works under my charge was more than doubled. This morning I intend to give you a few of my experiences in trying to meet this increased output, and that you may follow me better, I shall briefly describe the works as they were before the war.

I became Manager of the Vale of Leven Gas Company's works in the year 1908; the make of gas for the years since then being as follows:

1909-10	52,247,300 c.ft.	1913-14	74,413,600 c.ft.
1910-11	59,230,000 ,,	1914-15	74,350,400 ,,
1911-12	63,951,000 ,,	1915-16	121,700,000 ,,
1912-13	68,257,000 ,,	1916-17	154,350,000 ,,

Showing up to the outbreak of war, a steady annual increase.

The coal-stores have a storage capacity of 900 tons—equal to about five weeks' supply in winter before the war—and are adjoining the retort-houses. The old retort-house contains five ovens of six retorts each, and the new retort-house three ovens of eight retorts each, all on Hislop's patent regenerative system—in all fifty-four retorts, and equal to a maximum daily make of about 400,000 c.ft.

Two small boilers, one 14 ft. long × 4 ft. 6 in. dia., one 10 ft. × 4 ft. 6 in. dia., were situated at the end of the new retort-house. In 1913 we fitted a new boiler, 27 ft. long × 7 ft. 6 in. dia., at the end of the coke yard.

There were two sets of pipe condensers. The first consisted of sixty-four 8-ft. lengths of 5-in. pipes, four in a row—the gas passing through any of the four pipes. The second set of twenty 12-in. pipes were each 14 ft. 8 in. long. The available condensing surface, exclusive of the foul-main, was over 1560 sq. ft. These condensers were described by Mr. W. Currie, my predecessor, in his paper on "Some Experiences with Condensing Plant," read before the Association at the meeting in 1902.

We had also a tower scrubber consisting of two chambers, one filled with boards, which we utilized for working the "C" process; and two rotary exhausters, one capable of dealing with 15,000 c.ft. per hour, and the second one fitted in 1913, capable of passing 50,000 c.ft. per hour. Finding the scrubbers were too small to efficiently deal with the quantity of gas passing, in 1911 a Holmes brush scrubber, capable of dealing with some 500,000 c.ft. of gas a day, was fitted between the exhauster and the purifiers.

The purifiers, four in number, fitted with a Weck centre-valve, were 20 ft. × 20 ft. × 5 ft. deep, with two tiers of grids in each; the gas entering at the bottom and leaving at the top. Oxide of iron only is used. The gas then passes to the rotary station meter, capable of dealing with 30,000 c.ft. per hour, and thence to the gasholders, two in number—one telescopic, of 240,000 c.ft. capacity, the second, single lift, of 120,000 c.ft. capacity.

The gas connections from the foul main in the retort-house, which is 15-in., to the condensers, scrubbers, exhauster, and on to the inlet of the Holmes scrubber, are 10 in., increasing to 15-in. at the scrubber, with 15-in. inlet and outlet to the purifiers, reducing to 10-in. at the inlet and outlet connection to the meter. The inlet pipe to the second holder is 10-in and the outlet 12-in. The inlet to the first holder is 12-in., and the outlet 15-in., reduced to 12 in. at the drip at the holder, and from this point 12 in. to the town governor—a distance of about 150 yards.

The 12-in. outlet pipe from the town governor supplied one 12-in., one 9-in., and one 8-in. distributing mains, supplying the town. The first holder gave a pressure of 4½ in. when telescoped, and 3 in. when uncupped; the second holder, 3 in. We loaded our governor to give a pressure of 3 in. on the town at the heaviest load. We could only maintain this pressure when the large holder was telescoped; so, to get over the difficulty, a De Laval turbine booster was fitted.

When Messrs. Sir W. G. Armstrong, Whitworth, & Co. had taken over the Argyll Works, I had an interview with the manager, who pointed out what quantity of gas he estimated would be required. To meet these requirements, my Company decided to remove the two small boilers, and extend the new retort-house on the site occupied by them, adding two ovens of eights on the same design as the present ones; also to put down one set of water-tube condensers capable of dealing with 1 million c.ft. of gas per day. Unfortunately, we had not accommodation to place this condenser in its proper position before the tower scrubber; and the only site available was alongside the brush scrubber, after the gas had passed through the exhauster.

It was also arranged that a new 10-in. main be taken off the inlet pipe to the town governor, led direct into Armstrong's works, and a 10-in. governor fitted on it. The firm supplied the meter required—a 15,000 c.ft. per hour one, with 10-in. connections.

During the month of December, 1915, our output rose to over 500,000 c.ft. per day; and I had a very anxious time, as the retort-bench and condensers were not finished—having been kept back through want of men and materials. We got them completed in January, 1916; and our next trouble was to get them connected-up, as in both cases we had to stop making. I filled the holders up towards the week-end; and we managed to get finished with the connections all right before the holders got down too far.

The gas, previous to this, was passing through the meter at a temperature of 80° Fahr.; but once the new condensers came into action, this was rectified.

Our output remained fairly steady from January till about June, 1916, when it gradually began to increase, and the works asked for more pressure. I found, on examination, that the meter at Armstrong's works at 4 in. pressure on the inlet was absorbing 13-10ths; again when we increased the pressure to 6 in. at the inlet, the outlet only showed 37-10ths—the meter absorbing 50 p.ct. of the increase. I am sorry that up to the present we have not found out the cause of this; but the result is that we have to boost continuously, so as to maintain a 4-in. pressure at the outlet of the meter.

About this time the purifiers began to give us a good deal of trouble; and on investigation I found that tar was coming forward and choking them. It was decided to put in a washer, and also to alter the inlet and outlet connections to the purifiers, making the gas enter at the top and leave at the bottom—at the same time fitting the purifiers with hurdle grids. These grids were fitted about the month of October; and for some time after all went well. But, occasionally, I was still troubled with back-pressure, and had to open the lid of the purifier causing the trouble. Invariably we found the oxide on the top very moist and sticky; but when the top part was removed the trouble ceased for a time. I decided to try wood-wool spread over the top of the oxide; and this was done about the month of February. Since then I have never had the slightest trouble. The washer, capable of dealing with 1 million c.ft. per day, was connected-up about the middle of last January; and since it was started we have had no trouble with tar going forward. Whether it was the washer or the wood-wool, or both combined, I am not at present in a position to say; only I know I got rid of the trouble, and at a time when, if it had continued, I would have had great difficulty in dealing with it, owing to the shortage of men.

By the month of September our output increased to 640,000 c.ft. per day; and I then felt rather anxious about the coming winter. The output remained fairly steady till about the beginning of November, when the works began to ease-off. They were taking at this time something like 400,000 c.ft. per day—gradually reducing their consumption as the town increased. Had the lighting restrictions not been in force, we could hardly have kept up the supply. In 1915, when we found our works were likely to be very hard-pressed to keep up a supply, we decided to stop fitting any more new cooking appliances. Every house in the district was occupied; it was hardly possible to get lodgings; cookers, &c., were in demand, and it was very disappointing to have to stop fitting them.

The 15,000 c.ft. per hour exhauster was too small for the quantity of gas being manufactured. The large exhauster was started about November, 1914, and has been running since. The firm of engineers who do our work are now on Government work, and could hardly give us an engineer for overhaul. Last year we got one for a few days. But we could only allow the exhauster off for twenty-four hours; so that the overhaul was only temporary. During the recent holidays, we got our plant completely overhauled, which will keep us right for some time to come. Having only one boiler gave us a good deal of worry; but we only had to let steam down once due to trouble with the feed-pipe. It was not a very pleasant sensation to have to stand by helpless while it was being repaired—seeing the holders dropping rapidly.

Owing to the high temperature of the gas passing through the tower scrubber in which we worked the "C" process, I began to experience some trouble with naphthalene in the winter of 1916. The inlet to the No. 1 holder got stopped with it. To clear it, I flooded the drip; then we fixed a piece of wood, 11 in. dia., to the end of a length of ¾-in. malleable tube; and with this we plunged the pipe, using a quantity of "Solvit" in the water. This cleared the obstruction. To prevent the naphthalene gathering again, we introduced a "Simplex Vaporizer" in which we use paraffin oil. The vaporized oil passes into the gas at the outlet of the meter. We have also a connection so that we can pass it direct into the town mains at the outlet of the governor. Since the introduction of the vaporizer, we have had very little trouble; and we are now getting the oil in the drips on the town mains near the works.

Owing to the greatly increased quantity of gas manufactured, we required a number of extra stokers, &c. These were hard to get for a time; but later we got a number from Ireland, and most of them are still with us. When the munition works started, they offered great inducements to men to work in them, with the result that we had to increase our wages. Our stokers have now 19s. per week, and our yardmen 15s. per week, more than their pre-war rates.

I employ a man in the retort-house who does nothing else but clean the furnaces, attend to the dampers, &c., and is solely responsible for the heats—the stokers only attending to the charging and drawing of the retorts, &c. This is unusual for a works of our size; but my experience has been that the better heats, and having only one man who was responsible, warranted the increased cost. The hydraulic mains are washed through with ammoniacal liquor twice per shift of eight hours, which ensures a liquor seal. The pull on the retort-house governor is about 2½ in., reduced at the inlet to just over level gauge. The old retort-bench is in a very bad condition; and at the time the war broke out we were considering the advisability of rebuilding the whole house. The hydraulic main is all in one, and at the centre is about 1½ in. below the level. The hydraulic main on the new bench is subdivided with separate offtakes for gas and tar, which enable us to work with a more even seal.

We purchased the best coal we could get; and it was only through this and the extra good results we obtained, that we were enabled to pull through.

With a works designed to manufacture, under normal circumstances, roughly 400,000 c.ft. per diem, and extended to meet the requirements of about 550,000 c.ft. per day, one can understand the difficulties that we had to contend with to meet an output of nearly 650,000 c.ft.

MAINTENANCE MAN.

About five years ago, I had a number of the usual complaints about the quality of the gas, &c. On investigation, I found the trouble in most cases consisted of dirty burners. I decided to appoint a maintenance man; and I can assure you he has been a good investment. We arrange that he calls on all our consumers at least three times a year. He carries burners, globes, mantles, &c., with him, and should a consumer wish any of these, he fits it free, only charging for the article supplied. Again, should a consumer's burner require cleaning, he cleans it free. By his calling at the houses, I find we get in touch with the consumers in a manner we never did before; and by showing an interest in them, and trying to arrange that they get value for their money, we now find there is a better feeling between the consumers and the Company.

GAS CHEMIST.

Two years ago, Mr. Scott, of Cowdenbeath, when President, brought before you a suggestion that we constitute and equip a central laboratory in (say) Edinburgh or Glasgow. Since then your Council have had this matter under their consideration; and to-day, as you will see from the report, I am able to announce that we have arranged with Mr. Gemmel, of Edinburgh, to take on the duties for the ensuing year, and it now rests with you to confirm this.

The scheme is not quite so elaborate as the one suggested, which was rather much for us to tackle meantime, but will, I hope, meet the requirements of the members. Mr. Gemmel's laboratory is well equipped and suitable for the purpose. He is prepared to do the testing of any samples submitted to him, according to schedule rates. Of course, there are cases where the schedule rates will hardly apply, and these will require to be arranged. The schedule is a very comprehensive one, and reflects great credit on the framers.

It now remains for the members to make a success of the scheme; and, while it is not expected you will make work, still it is desired that you should put forward as much work as possible. I am certain, as time goes on, that we shall all benefit from the scheme, which, with experience, can be improved.

SCOTTISH GAS COUNCIL.

During the past winter, difficulties were experienced regarding coal, &c., and I have no doubt it is well known to most of the members that the engineers and conveners of some of our large cities met and discussed the position—thereafter making representation to the proper quarter in reference to the matter under review. We all appreciate what was done by these gentlemen, as I am quite sure most of us benefited by their representation. But it raised the question in my mind, "Was this Association meeting all our requirements?"

The matter was brought up by Mr. J. W. Napier at a Council meeting held in the spring of the year; and after discussion the feeling of the members was that a Gas Council for Scotland should be formed. The idea was that the Council should consist of (say) the engineers and conveners or chairmen of a certain number of the larger gas undertakings, a certain number of members from the Council of this Association, the President for the time being of the Waverley Association, and the Chairmen of the two Commercial Sections.

The Council would be in a position to take up any question of interest to the industry in Scotland, and would be able to act immediately. In my opinion, the Council should become in some way affiliated to the National Gas Council, and would look after things immediately concerning Scotland in conjunction with the National Gas Council.

This raises another question, of whether the name of the Association is the most suitable one at the present time. This question was brought before the members on a motion by Mr. Carmichael, of Barrhead, at the annual meeting held in 1906, and was finally decided at the meeting held in 1907, when it was defeated. Since then, many changes have taken place; and, while I am averse to changing names, especially where (as in this case) they have been of long standing, still I think if anything is to be gained by the change, the members should give it very serious consideration. Many of the points then raised for and against the proposal still hold good; but when the formation of a Scottish Gas Council is before us, we should also consider this question. An opportunity to consider these questions will be given at the meeting.

COAL CONTROL.

The Coal Controller has now issued his directions for the purpose of re-organizing the transport of coal by public railways, &c., and these, according to the instructions, take effect after to-morrow.

Mr. Thomas Glover, representing the Coal Controller, arranged a meeting with your Council, to which a number of managers of the gas-works most affected were invited. He was accompanied by Mr. Bamford. Mr. Glover and Mr. Bamford explained the new directions, and the whole position was fully gone into—the cases of Perth, Stirling, and Johnstone being cited as showing how the dividing line would adversely affect these works. So far as area No. 17, Scotland, South-Eastern Counties, No. 18, Scotland, North-Western Counties, and No. 20, Scotland, South-Western Area, are concerned, the directions may be regarded generally as satisfactory. But area No. 19, Scotland, North-Eastern, is the one in which the greatest difficulty and trouble will be experienced as regards gas-works. The supplies, according to the directions, are to be drawn from the Fife coalfields, and it is well known that most of these coals are very poor for gas-works purposes—in fact, very few gas-works use more than a very small percentage of the coals. This was fully put before the representatives of the Coal Controller, who indicated that in cases where there was strong evidence that the coal was unsuitable for gas-works, sanction would likely be given to draw upon other areas for a certain percentage of their requirements.

The facts and figures put before us were amazing, and can they but save even one-half of the ton-miles they calculate on, it will be a great achievement.

The Coal Controller has arranged to appoint a neutral person to the Coal and Coke Committee. We considered that the gas industry should have at least one representative, which the representatives agreed to consider with the Coal Controller; and I am now informed he has appointed a second neutral person. Whether this is enough, time alone will tell; but we will hope for the best.

LABOUR.

The supply of labour to keep our works going efficiently has been a constant source of anxiety—principally owing to the requirements of the Army and Navy. The workmen in many cases, knowing the difficulty of filling their places, asked for increases, which, in any other circumstances, would never have been considered. Arbitration was resorted to in many cases, and a settlement made for the time being; but if from any cause whatever a works increased the rate, the others around had to follow suit. In one case the stokers asked for 5s. per week; the matter was discussed with them, and as no agreement was likely to be come to, the manager suggested arbitration. The deputation simply stated that if the arbiter awarded less than the 5s. they would leave, as they would not work for less than such-and-such a place which had granted it. Here was a difficult position, and rather than have more trouble, the manager agreed. The result is, other works have to follow; and so the thing goes on.

Under the Schedule of Protected Occupations, which came into force in May, stokers above 25 years old were exempted. Now I understand the age limit is likely to be raised to 31. This will hit some works pretty hard, as, for instance my own, where I shall lose nearly 50 p.ct. of my stokers. I am afraid there will be great difficulty in finding substitutes; but we must do all in our power to supply the men required and at the same time keep going.

We are bad at present, and may be a good deal worse before the end. But what would our feelings be, should we lose the war, if we had kept some back?

Murray's lines strike me as very appropriate:

"Ye've read aboot Bruce an' Wallace, an' the fechts that they focht langsyne,
An mony a tale an' ballad hauds your forbears' deeds in min';
O, they were the lads for Scotland, they stood for her staunch an' true,
But what o' the bairns that's comin', will they say the same o' you?"

* * * * * *

"Ye stand to the toast 'Wha's like us?' an' shout as ye answer 'Nane,'
Weel, noo is the *time* to prove it, i' the teeth o' the war'l again."

I have had many experiences and difficulties during the last three years, and often was in what seemed a hopeless position. But I never lost hope; and sure enough something always turned up, and got me out of my difficulty. At times like that, I often think of the old Scotch saying, "There's never a bad, but there could be a waur'."

Women have done well in many of the larger works where automatic machinery is employed. In smaller undertakings, where most of the work is done by hand, they are not able to stand it. But we must make the most of them and encourage them to do their best.

CONCLUSION.

Well, gentlemen, in conclusion, I realize I have only touched on a few points of interest, and only the fringe of these. But I am sure you will look with indulgence on any shortcomings which may be apparent to you in this effort of mine, and believe that while I have had much pleasure in writing it, yet the feeling remains that I may not have done justice to my subject, or made myself as clear as I should have liked to my indulgent hearers.

I thank you for the honour you conferred upon me by appointing me your President, and I hope that I hand over the reins of office untarnished to my successor. Let us hope that during his year of office, this war may be brought to a close, and that victory shall crown the efforts of the allies.

Mr. ROBERT MUIR (Galston) said he had been deputed by the Council to propose a hearty vote of thanks to the President for his admirable and interesting address. There had been many capital presidential addresses at Association meetings; but he believed the contribution they had that day had from Mr. Lang excelled anything that had gone before. Mr. Lang, as they had heard, had experienced

many difficulties; but in meeting and surmounting them all, he had shown the grit of a true Scotsman.

The PRESIDENT, in acknowledging the vote, said he felt amply repaid if his address had proved of interest. The address was prepared a little more hurriedly than he anticipated; and in these circumstances he felt pleased if it proved useful and instructive to the members.

Proposed Gas Council for Scotland.

The PRESIDENT said that, before calling upon Mr. J. W. Napier, of Alloa, to open a discussion on the proposal which was being put forward for the establishment of a National Gas Council for Scotland, he would like to read a letter which had been received on the subject from Mr. D. Milne Watson, the Chairman of the Executive Committee of the National Gas Council of Great Britain and Ireland. The letter was in the following terms:

39, *Victoria Street, S.W.*
Sept. 5, 1917.

Dear Sir,—Your letter of the 31st of July, regarding the proposal to form a Scottish Gas Council was considered at a meeting of the Executive Committee yesterday.

It was the general feeling of the Committee that the proposed title, "Scottish Gas Council," would be unfortunate, as it would tend to give the impression that a cleavage had taken place in the unity of the National Gas Council—a body which is recognized by the Government as representing the whole of the gas industry in Great Britain and Ireland.

As the Executive Committee understand that there is no desire on the part of the North British Association of Gas Managers in any way to cause a disruption to the National Gas Council, and that what is really desired is the formation in Scotland of one Association which can represent the views of all the various sections of the industry throughout Scotland, the Executive Committee consider that this object might be achieved by the formation of a Scottish Gas Association or Committee.

The matter you raise is of very considerable importance; and the Committee would be glad, before any definite steps are taken, to meet the representatives nominated by the North British Association of Gas Managers, or any other Scottish Association, to discuss the matter fully at an early date.

I shall be glad to hear from you as to this suggestion, which I hope will be acceptable, when a suitable date and place of meeting can be arranged.—Yours faithfully,

D. MILNE WATSON,
Chairman of the Executive Committee.

John Lang, Esq., Engineer and Manager of the
Vale of Leven Gas Company.

Mr. J. W. NAPIER (Alloa) said the subject which he felt it his duty to bring before the meeting that day was one of considerable importance to themselves as professional men, and of equally great importance to the gas industry. In these days of change, when the future was so very obscure, they would agree with him that they could not hope to proceed on the old lines. The old methods and influences might have proved happily successful in the past; but with the changes now going on, they could not hope to continue, as he said, unless they too made the changes that were so needful in these particular times. It had been borne in upon him that the North British Association in the past had adequately fulfilled its duty as a Technical Association. One feature of its constitution must not be overlooked—namely, that it was a changing body. This, to his mind, was the one feature which explained why the Association had not successfully grappled with the larger questions that affected the industry. It was not proposed as the outcome of the formation of the Scottish National Gas Council that the technical Associations—such as the North British Association, the Waverley, and the Scottish Gas Managers' Associations—should in any degree whatever be altered; nor was it intended that the Commercial Sections should in any way be changed from their particular department of business. The technical and commercial requirements of the industry could only be met by such Associations as he had enumerated; but they in Scotland felt that there were legislative aspects in regard to the consideration and settlement of which they were under certain disabilities, because of the geographical situation of the country. As things were, London was the centre and the pivot round which revolved all the consideration of the more important affairs affecting the industry. This particular disability was one, of course, for which they were in no way responsible; but it undoubtedly had been the means (to some extent, at least) of alienating the Scottish gas managers and engineers, and of preventing them from participating in the discussion of the larger questions that he had just referred to. It was, therefore, with the object of enabling professional men in Scotland to give full justice to these larger questions that this Gas Council for Scotland was proposed. It had been found from experience that Scotland's single representative on the Institution of Gas Engineers was altogether unsatisfactory, in so far as it was not considered a sufficient representation. Similarly, in the case of the National Gas Council, Scotland again was at a disadvantage. As he had already indicated, the geographical position of Scotland furnished one of the reasons, and probably the main reason, why the managers and gas engineers in the country had not been able to take a greater interest in the business of the profession. It was hoped, therefore, that the proposed new Gas Council for Scotland would deal with all questions of immediate interest to the Scottish gas industry and to Scottish gas engineers and managers. They knew, for example, that the majority of works in Scotland belonged to burghs; and in the near future it was expected that the Burghs Gas Supply (Scotland) Act—which so very well met the needs of the industry—was likely to be amended. This was one subject which could best be dealt with by those of them who were in Scotland. Then, as gas managers and engineers, they were also interested in the competition with electricity. They knew that Special Committees were being formed to bring about the centralization of electricity supply; and, because this was so, they in Scotland were fully aware that certain measures of protection must be taken, having regard to the inroads of the competitor to gas—electricity. Then it was also possible that the proposed Gas Council for Scotland would take up the consideration of other matters as, for example, the question of valuations. Just recently it was brought home to many of them that the practice of several of the assessors in Scotland was such that gas companies and gas undertakings were placed at a disadvantage in not being able to get all the deductions they were entitled to. It was, moreover, believed that the Scottish Gas Council would also be helpful to the British Commercial Gas Association, in furthering its interests; and to the Sulphate of Ammonia Association, in promoting its usefulness and its influence throughout Scotland. As regards the constitution of the Scottish Gas Council, he wished to make it perfectly clear that it was not intended to have it separate from, or opposed to, the National Gas Council of Great Britain and Ireland, which had its headquarters in London. The interests of the Scottish Gas Council would be collateral with the interests of the National Gas Council; and it was hoped that the advantage to both would be mutual. It must be recognized that the North British Association—being a changing body—could not be held to be fully representative of the gas industry in Scotland. The Presidents of the Association were elected annually; and that being so, their interests and influences were quickly shed. The position of matters being thus, it became clear that if the Scottish Gas Council was to be successful and satisfactory in its efforts, it must be properly representative of the Scottish gas industry. It required then to be recognized that, on the Scottish Gas Council, there must be the representatives of the larger gas undertakings in the country. Incidentally, he would in this connection mention the cities of Edinburgh, Glasgow, Dundee, and Aberdeen. He specially emphasized the fact that the gas officials of these four cities should be members of the Scottish Gas Council, because of the influence they were bound to have, having regard to the position which they occupied, and the importance of their respective undertakings. It was also proposed that the medium and smaller-sized gas-works in Scotland should be represented on the Scottish Gas Council, and that the North British Association, together with the Waverley Association and the two Commercial Sections, should be asked to nominate members. It would therefore be seen that the Scottish Gas Council would be truly representative, in so far as it would comprise all the influential members of the industry in the country. It was well to bear in mind, when considering this subject, that during the past two years the responsible gas officials in Edinburgh, Glasgow, Aberdeen, and Dundee had taken it upon themselves to meet regularly and to focus the attention of authorities and governing departments on matters affecting the industry. In the whole circumstances, he was prepared now to put forward for the consideration of the meeting a motion to the effect that the gas engineers of the cities of Edinburgh, Glasgow, Dundee, and Aberdeen should meet, along with the Council of the North British Association of Gas Managers, and formulate the constitution of the proposed Scottish Gas Council, with power to report to another meeting.

The PRESIDENT, in inviting some of the gas managers outwith the Council of the North British Association to give expression to their views, said they desired to have an authoritative decision in regard to the attitude which the industry in Scotland was likely to adopt.

Mr. J. D. KEILLOR (Hawick) asked if the work outlined by Mr. Napier in his speech was not capable of being carried out by the National Gas Council of Great Britain and Ireland.

The PRESIDENT said evidently it was not thought so when several gentlemen brought forward this proposal.

Mr. DAVID VASS (Perth) considered that the subject which Mr. Napier had brought to their notice was one that needed very serious consideration. There was one point he did not observe in his address, and that was whether it was intended or suggested that representatives from the various municipal gas committees, &c., should be members of the Scottish Gas Council.

Mr. J. W. NAPIER replied that it was his intention to state that the needs of the industry, both from an influential and a financial point of view, would best be met if they included in the Gas Council representatives of the various municipal undertakings.

Mr. DAVID VASS said he felt quite glad that Mr. Napier was willing to take this course, as he believed it would strengthen the position and influence of the proposed Scottish Gas Council. He would throw out the suggestion, too, that representatives from the principal gas companies in Scotland ought also to be invited to join the Council. The interests of these companies were sometimes quite different from those of the corporation and municipal undertakings. He merely put forward this idea as a suggestion, because he believed it was better that a Special Committee should deal with the subject and bring forward various recommendations in regard to it. The one drawback he saw was that the North British Association of Gas Managers only met once a year, and it would be unfortunate if the scheme should be held up until the next annual meeting. Of course, if they were unanimous, a good deal of initial work in connection with the scheme could be carried on before the next annual meeting of the Association. It seemed to him, further, that the suggestion might also be considered of joining the Scottish Gas Council with the Association under whose auspices they were that day meeting. Certain financial questions would require to be kept in view; and if the Gas Council and the North British Association were linked-up in some way or another, it would be possible to more effectively deal with these.

[No further account of the proceedings had been received from our reporter at the time this number of the "JOURNAL" was made up for press.]

Pacific Coast Gas Association.—Everything promises well for the 25th annual convention of the Association, to be held this month at Santa Cruz. A preliminary announcement to hand from the Secretary (Mr. Henry Bostwick) shows that, following the address of the President, Mr. C. B. Babcock, a long and varied list of papers will be submitted; and there will also be reports by the Chairman of the several Standing Committees. The Gas Appliance Committee have arranged for a gas exhibition; and the social side has by no means been overlooked. At the close of a quarter-of-a-century of life, the Association can boast of 427 names on the membership roll.

CONTINUOUS VERTICAL RETORTS IN A FIFTY MILLION WORKS.

By H. G. RITCHIE, of Irvine.

[A Paper read before the North British Association of Gas Managers, Sept. 7, 1917.]

When I took over the management of Irvine Gas-Works on Jan. 1, 1913, I found the horizontal retort-bench, which consisted of thirty-nine 9 ft. 6 in. retorts, in very bad order, and the holder accommodation only equal to 0·6 of the maximum day's output. I at once started preparations for the telescoping of the larger holder; and, when the maximum period was passed, I made a thorough examination of the old retort-bench, which confirmed my already conceived opinion that a new bench was absolutely necessary.

After careful consideration and visits to other works, both in Scotland and England, and as our storage was ample, and lying-off would be avoided, a vertical installation was decided on. From experience gained in the working of continuous verticals, although proper holder accommodation is as advantageous as it is with horizontals, it is not more necessary, owing to the variations that can be effected in the output per retort by varying the speed of the coke extractors. The installation is on the Woodall-Duckham Company's continuous system, and comprises six of their standard "3-ton" retorts. This was the first installation of these small retorts to be erected. The entire installation, setting, engine-house, and lift occupies a space of 60 ft. × 30 ft.—sufficient space being left for an extension of two retorts when required. The guaranteed daily production of gas was 250,000 c.ft., but without pressing the plant or producing blue-water gas, taking over a month, the daily average output per retort was 50,200 c.ft.—*i.e.*, equal to 301,200 c.ft. for the installation. The maximum day's output per retort was 59,000 c.ft.

DESCRIPTION OF THE RETORTS.

The retorts, which are 25 ft. long, are placed in two rows of three retorts each, heated by two furnaces, one for each side. Each retort is a separate unit; a straight joint being built between each. The furnaces, which are of the stepped grate type, are large enough for four retorts each—provision having been made for extension. The primary air supply to the furnaces is pre-heated, and is led over a vaporizing pan; the moist and heated air passing into the furnace through two hoods provided with regulating dampers. The vapour in the air tends to keep the clinker soft. With coal having a high ash content, however, I have found it advisable to provide a steam supply as well; but only a very small quantity is necessary. The furnaces are cleaned three times weekly, running two periods of 48 hours and one of 72 hours. The fires were pricked-up once per 8-hour shift. The carbonic oxide flues run along each side of the setting, and an up-take, with regulating damper, is provided, one on each side of each retort. The secondary-air flue is common to both sides of the setting, and runs along the centre of it, with off-takes the same as the carbonic oxide flues. Combustion occurs practically at the top of the retort. The carbonic acid is divided into two streams down each side of the retorts, and two dampers are provided on both sides at the retort bottom, to enable the heats to be equalized. It is then brought to the main carbonic acid damper, and thence to the regenerator. Three main dampers are provided at the end of the regenerator. All internal brickwork, including the retorts, is built of tongued and grooved bricks. The chimney is constructed of steel, brick lined, and gives a minimum pull of 7-10ths, which is ample for the efficient working of the plant.

HOUSING OF THE PLANT.

There is, strictly speaking, no retort-house. The installation was erected in what was a coal-store. In order to cover in the bottom portion of the plant, the existing walls of the shed were raised, and lean-to roofs carried from the wall to the buckstaves; thus covering in the carbonic acid damper platform and a portion of the brickwork. On the top of the setting the steel framed structure carrying overhead bunkers is extended, and arranged to take a light steel roof. Angle steel purlins are fitted to the steel framework; and these carry the corrugated asbestos sheets with which the sides of the part of the installation above the setting is completely covered in. The roof and lean-to roofs are also covered with corrugated asbestos sheets. Twelve feet of the setting brickwork is exposed, although sheltered from the rain to an extent by the upper or carbonic oxide damper platform.

METHODS OF WORKING.

The coal, and the coke for the furnaces is raised to overhead bunkers in skips by means of a 25 cwt. belt-driven lift; the power being supplied by a National gas-engine. The capacity of the coal-bunkers is 36 hours maximum requirements, and the coke-bunkers 48 hours. From the bunkers, the coal passes through a throughway valve into the feed hoppers, the capacity of which is 1¼ to 2 hours, according to speed of the coke extractors. In working, we fill-up every hour. The coke-extractors are of the Woodall-Duckham Company's usual type, and are operated by a small steam-engine. The coke-chambers under the retorts have a capacity equal to two hours' production of coke. The discharging doors are of a type somewhat similar to the Tangye door. I found the facing got so bad in about three months' time that they had to be faced-up. This was due to the water admitted at the top of the coke-chambers washing down the coke-dust; and though the operators wiped the faces, probably the extractor had come into operation, or more dust had been washed down, before he got the door closed. To save the cost of facing, and as it is the underside that was affected most, I had V-shaped troughs made, in which the lower half of the door is sealed in water. The gas passes from the retort by an arched offtake; a disc-valve being provided for each retort. The gas passes to a common hydraulic main, which has a fall to one end, where a tar overflow and seal-pot are provided. The hydraulic main and rising main from it are flushed with liquor daily. Three times weekly would be sufficient, but by making it a daily duty there is less chance of it being forgotten. The offtakes are not sealed in the liquor.

In working, it is advisable to scurf the retorts after six to seven weeks' working, although I have run for ten weeks without having much trouble with charge hanging. This will, of course, vary according to nature of coal used. Most of the carbon is to be found in the top 10 ft. Air is allowed to pass up the retort until the carbon drops off. Scurfing takes 60 hours, including the emptying and refilling of the retort; but if bars were used, it could be accomplished in less time.

The only repair to the brickwork so far has been the renewal of the lining of one furnace. I do not anticipate the renewal of retorts for a considerable time yet.

In working at present, the coal travels through the retorts in fifteen hours, using coking nuts. I have tried splints, a mixture of cannel and coal, also unscreened coal and coking coal; but coking nuts are by far the most suitable fuel.

As this type of retort cannot be worked without an exhauster, either boiler or exhauster should be in duplicate. In our case, I had a new 22 ft. × 6 ft. Cornish boiler put down, as the age of our old boiler is doubtful, and has only been insurable for 45 lbs. pressure for many years. My Company bought it second-hand 25 years ago. I also had a pump exhauster which had been out of use, overhauled and parts renewed; so that we now have both boilers and exhauster in duplicate.

WORKING RESULTS.

The working results taken over the year have not been so satisfactory as they should be, due to certain trouble with the coke-discharging doors mentioned previously. To avoid drawing in air at these doors, it was necessary to work with a pressure of 3½-10ths to 4-10ths at the top of the retort, and as a further safeguard the rate of extraction was quicker than it has been since the troughs were fitted. However, the actual figures for the year are:

Gas per ton of coal used	10,825 c.ft.
Coke sold per ton of coal used	6·52 cwt.
Tar and liquor mixed, per ton used	67·45 gallons.

I cannot give the calorific value of the gas, as the calorimeter has only been in use since the close of the year.

Since the troughs were fitted, six months ago, I have worked with about 1-10th inch pressure at the top of the retort; and the average make per ton has been 12,039 c.ft., of a calorific value of 520 B.Th.U. The make per retort per day is now reduced to 45,000 c.ft., or 270,000 c.ft. for the installation. Over the past three months, with one furnace only working, the coke sold per ton of coal has been 7·51 cwt., due to better adjustment of the primary air. The original regulating damper having jammed, an ordinary tile damper has been substituted. We are also pricking fires twice daily, instead of three times as formerly.

I should state here that in similar installations to the Irvine one, since erected in Scotland, the Woodall-Duckham Company have provided their standard type of coke discharging door. The departure from this at Irvine was to reduce the cost of the installation.

The average strength of liquor was 4·6° Twaddel, giving an average yield of 57·24 lbs. of sulphate per 100 gallons, from the free ammonia only. These are figures given us by tar distillers—our liquor being sold on a yield of sulphate per 100 gallons basis. This works out at 31·74 lbs. of sulphate per ton of coal carbonized, assuming the yield of tar to be 12 gallons per ton used. The average of two samples of liquor gave 12·15 p.ct. of fixed ammonia; but as the tar distillers to whom the tar and liquor are sold have no plant for recovering this, we get no credit for it.

To depart from the subject of verticals for a minute, I notice greater differences in the yield of sulphate from liquor of the same Twaddel, or nearly so, than I hitherto expected to find. Distillers' reports on consecutive dates were:

Week ending April 19, 1917.	Twaddel	4·9.	Yield of sulphate	63·4 lbs.
" " 26 "	"	5·0	"	"	64·4 "
April 27 to 30, 1917.	"	5·25	"	"	60·3 "
May 1 to 10 "	"	5·0	"	"	59·5 "

As is now well known, vertical retort tar is not so efficient as horizontal tar for toluol recovery. The results are:

	Untreated Tar.	Treated Tar.
Specific gravity	1·095	1·09
Percentage of crude naphtha up to 145°	1·5	4·08
Percentage of crude naphtha 145°–170°	1·4	2·02
Toluene in 200 gallons (5 p.ct. water content), lbs.	2·4	11·75
Benzene in 200 gallons (5 p.ct. water content), lbs.	not stated	25·15

The best results with horizontal working at Irvine were—

Gas per ton of coal used	9702 c.ft.
Coke sold per ton	7·68 cwt.
Tar and liquor, liquor 3·75 to 4 Twaddel	52·84 gallons

At another Ayrshire works with horizontal retorts, the average results over five years have been:

Gas per ton used	10,124 c.ft.
Coke sold	7·5 cwt.
Tar and liquor mixed	58·2 gallons

I have run several twenty-four hours' tests, for gas only, with the following results:

		C.Ft. per Ton.		B.Th.U.
(*a*)	Ayrshire treble nuts	10,900	..	—
(*b*)	,, ,, ,,	12,335	..	510
(*c*)	,, coal	11,855	..	515
(*d*)	,, splint	10,813	..	508
(*e*)	Lanarkshire coal	12,538	..	504
(*f*)	,, ,,	12,870	..	516
(*g*)	,, ,,	12,734	..	530
(*h*)	,, nuts	13,327	..	499
(*i*)	,, ,,	12,883	..	520
(*j*)	,, ,,	12,960	..	499

Carbonizing costs (stokers only) worked out at 1·649d. per 1000 c.ft. made, and with horizontals for the last complete year, adding the increase in wages to make the figures comparative, at 3·248d. Wages for coal handling and gas consumption of the engine, for verticals cost 0·601d. per 1000 c.ft. made. The cost with horizontals was 0·507d. One stoker per eight-hours' shift is employed all the year round. The stoker's duties, besides attending to all work on the retorts except raising coal, include wheeling away coke, attending to the boiler and exhauster, also the tar-pump. The coal is raised at night for the twenty-four hours, so there are always two men on the works.

STEAMING.

I have only been in a position to start steaming this week. I am at present working three retorts, and have a steam supply fitted to one retort only. There is a ½-in. steam wheel-valve on the main supply, and a ¼-in. steam plug-cock (to which latter a scale has been attached, to enable me to tell accurately how much the cock was open) on the pipe led into the coke chamber above the coke extractor. The following are the results of two trial runs:

First Run.

Run.	Steam.	Make per Hour.	Average Value.	Length of Jet Flame.	Steam Pressure.
		C.ft.	B.Th.U.	In.	Lbs.
4 hours	No steam	5600	517·5	3·00	—
4 ,,	Steam cock quarter open; valve open quarter turn.	6150	507·0	2·95	60

Second Run.

3 hours	No steam	5180	517	7·3	—
2 ,,	Cock quarter open; valve quarter turn.	5200	—	7·2	48
4 ,,	Cock full open; valve one-third turn.	5800	514	6·7	48

This gives an average increase in the output of about 11 p.ct., which, added to the unsteamed make of 12,039 c.ft., give us 13,363 c.ft. per ton, with a decrease of 2 p.ct. in calorific value.

The coke extractors were run at the same speed and the same pressure—viz., 1-10th of an inch, maintained at the top of the retorts throughout. The top heats during the runs were 2246° and 2282° Fahr. respectively. In my opinion, better results could be obtained from steaming, if the hottest zone was further down the retort. This could be done without much structural alterations, by carrying the secondary air further down.

For the benefit of managers in works such as those of which I am in charge, I would just say that vertical retorts will not eliminate all their worries. After the plant was properly started, I have not had any real difficulties in working them; but, at the same time, they require more skilled attention than can be given by the ordinary gas stoker. However, against this, the reduced anxieties—no one is absolutely free from them—due to labour troubles have amply compensated me for the extra attention I have had to give to the vertical retort installation.

THE DEHYDRATION OF TAR.

By G. H. SHARPLES, of Glasgow.

[A Paper read before the North British Association of Gas Managers, Sept. 7, 1917.]

The term "dehydration" has different meanings when used by the tar distiller or the gas engineer. The tar distiller usually suggests by the term a simple preheating of the tar, by means of waste heat economized either from the flues of the stills or by heat recovered from the vapours of the distillates from the tar plant, using the tar as the cooling medium instead of water. The gas engineer, however, understands by the use of the term, the distillation of the light oils, together with the water present, leaving a product known as dehydrated or refined tar, which is suitable for use in road spraying. The light oils thus obtained can be sold as such to the distiller; but in some cases they are rectified in small stills on the spot—the latter being considered as integral parts of the tar-distillation plants.

The "Call of the War" appears to have modified considerably the use of the latter portion of the plants, as no real separation into the pure products, benzene, toluene, xylene, could be made in these small stills. It is now deemed advisable to transfer the crude oil to the tar distiller, who, with larger plants and more perfect fractionation, can produce these valuable products continuously, in a practically pure state. In order to understand clearly the work which these plants are called upon to do, it is necessary to have a general knowledge of the constitution of tar, as revealed by general tar distillation.

COMPOSITION OF TAR.

The composition of the tar varies, of course, through many causes. The following are the principal:

1.—Quality of coal, dependent on the district.
2.—Type of retorts used—horizontal or vertical.
3.—Temperature of carbonization.

1.—The quality of coal cannot always be governed absolutely, as the gas engineer is dependent chiefly on the nature of the coal obtainable in his own district. For example, Scotch coals generally yield less tar than (say) Lancashire coals. Again, Lanarkshire coals yield a class of tar differing from the Fife coals.

2.—Once the gas engineer has decided which class of retort to instal for gas making—that is, the one which will give him the best yield of gas—so, in a large measure, has he determined automatically the quality and yield of tar.

3.—The temperature of carbonization alone can be controlled, and naturally this is done for the primary object—yield of gas.

But the "Call of the War" has altered this considerably, and gas engineers are now asked by the authorities to work with a view to increasing the output of the products required for the successful prosecution of the war. It is also quite certain that, when normal times return, the demand for these products in this country will continue and grow, by reason of the demand for intermediate products for synthetic dyes, which will absorb the same compounds which now are used for high explosive and munition work generally. It is necessary, then, to examine tar hydration as practised in gas-works from this standpoint. Does this method of working-up the tar yield the valuable products to the greatest advantage to the country. To answer this question, let us look at the composition of tar yielded. The same class of coal was carbonized at two different gas-works in Scotland—one with horizontal retorts, and the other with vertical retorts—giving the following results:

	Horizontal Retorts. P.Ct.		Vertical Retorts. P.Ct.	
Water	1·55	..	2·42	
Crude naphtha	2·62	12·06 ..	2·44	18·55
Light oils	9·44		16·11	
Carbolic oil	12 09	..	14·10	
Creosote oil	13·00	..	21·47	
Pitch	61·30	..	43·38	
Loss	—	..	0·08	
	100·00		100·00	
Specific gravity of tar at 60	1·20	..	1·075	

On the obvious effects of carbonization under the two methods, I need not dwell.

These, resolved further, show the following constitution:

	Vertical Retorts.			Horizontal Retorts.		
	Gallons per Ton.	Per Cent. by Weight.	Pounds Ton Coal Carbonized.	Gallons per Ton.	Per Cent. by Weight.	Pounds Ton Coal Carbonized.
90's benzol	1·340	0·515	0·747	2·507	0·984	1·299
90's toluol	0·832	0·317	0·460	0·818	0·318	0·420
Solvent naphtha	4·252	1 615	2·342	2·537	0·986	1·302
Total naphtha	6·424	2·447	3·549	5·862	2·288	3·021
Heavy naphtha	6·240	2·409	3·493	3·979	1·652	2·178
Refined pyridine	0·354	0·160	0·232	0·160	0·76	0·100
Heavy pyridine bases	0·832	0·383	0·555	1·165	0·532	0·702
60's carbolic acid	2·311	1·074	1·557	0·200	0·094	0·124
Cresylic acid	12·48	5·913	8·574	5·230	2·451	3·234
Light creosote	16·039	7·126	10·339	43·065	20·381	26·902
Heavy creosote	66·102	31·009	44·965			
Naphthalene	6·839	3·455	5·017	9·00	4·620	6·098
Pitch	..	43·380	62·901	..	66·425	87·7
Am. liquor, 3·3 per cent. NH_3	5·366	2·420	2·030	2·980	1·356	1·800
Loss	0·322	0·224	0·325	0·280	0·125	0·165

Examination of the rectified naphthas gave the following interesting results:

	From Vertical Retorts.		From Horizontal Retorts.	
	P.Ct. Paraffin.	Sp. Gr.	Paraffin.	Sp. Gr.
90's benzol	19	·865	Below 1 p.ct.	·881
90's toluol	12	·863		·872
Solvent	6	·851		·871

In passing, I would call your attention to the quality of the naphthas recovered from vertical retorts. This opens up the most important question as to whether it is advisable to work-up together tar from horizonal and vertical retorts, when the object is to make pure products. Even when the tar is distilled on the gas-works, the same question presents itself with respect to the recovered light oil from the dehydration plants.

The next question in the examination of the product is from which fractions are the valuable products recovered, particularly in dehydration plants? The rectified naphthas naturally are recovered from the crude naphthas and light oils in ordinary tar distillation, and from the light oils given off in the process of dehydration. But, unfortunately, all the rectified naphthas are not thus recovered. The crude naphthas and light oil given in the preliminary distillation correspond to the portion of the tar that is driven off during dehydration. Considerable quantities of creosote are also carried over in dehydration, because real fractionation is at a minimum, and, conversely, considerable quantities of naphtha are left in the dehydrated tar. Examination of the oils distilled from the dehydrated tar reveals this. The ordinary retort test does not show the presence of light oil; but careful fractionation shows that the oil distilled between 175° and 270° C. from the dehydrated tar can contain as much as 2 p.ct. of light naphthas.

Retort Test. Dehydrated Tar, Per Cent. by Weight.		Fraction 175° to 270° distilled through Column after Washing.	
Drop	175° C.	90's benzol and toluol	0·5 p.ct.
175-270°	13·33 p.ct.	Solvent	0·5 ,,
270-315°	14·02 ,,	Heavy naphtha	11·0 ,,
Free carbon	6·01 ,,		

The percentages of naphthas left in the tar compared with the total quantities in the original tar are:

90's benzol and toluol	8·0 p.ct.
Solvent	5·8 ,,
Heavy naphtha	44·5 ,,

The effect of these bodies on the dehydrated tar will be examined later.

The tar acids, however, present the greatest interest. These are found chiefly in the carbolic oil, or middle oil, fraction in ordinary distillation—the fraction which corresponds to the lighter portion of the heavy oils left in the dehydrated tar. A large portion is recovered in the crude oil taken off in the dehydration, by reason of the quantities of creosote carried over with the oil; but 50 p.ct. of the total quantity is left in the dehydrated tar.

The following comparison between the light oil and carbolic oil fractions confirms this:

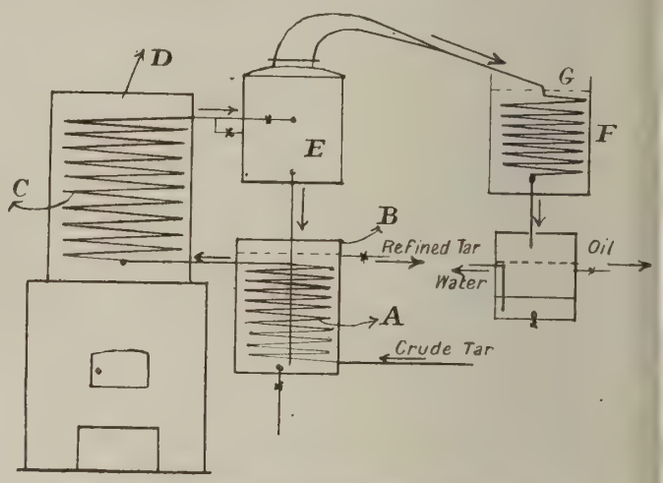
—	Crude Naphtha and Light Oil Fractions.	Carbolic Oil and Light Creosote Fractions.	Dehydrated Tar Oil, 270° C.
	Gallons per Ton of Tar.	Gallons per Ton of Tar.	
Total tar acids	4·76	4·78	4·7
Phenol	·66	·092	Not estimated

In compensation, however, it will be noticed the tar acids in the light oils are much richer in phenol or carbolic acid than the creosote. At present, when the crude oils are being disposed of as such, it is probable the tar acids contained therein are being recovered; but in the simple system of washing, instituted on these plants, these valuable products do not seem to be saved. A comparison of the light oils yielded from these plants with the light oils as obtained by the ordinary method of distillation is interesting:

—	A. Light Oils from Ordinary Distillation, Horizontal Tar.	B. From Dehydration Vertical Tar (Kilmarnock).	C. From Dehydration Vertical Tar (Johnstone).
	P.Ct. by Vol.	P.Ct. by Vol.	P.Ct. by Vol.
Tar acids	22·21	27·5	27·0
Pyridene bases	2·74	5·0	7·0
90's benzol	5·15	1·9	1·0
90's toluol	2·94	2·2	1·5
Solvent	10·54	6·5	3·5
Heavy naphtha	8·18	4·8	6·7
Creosote	44·20	48·1	51·3
Loss	4·04	4·0	2·0
	100·00	100·00	100·00

In comparing these, it must be borne in mind that the two latter oils are from vertical tar, which yields more naphthas than horizontal tar. The character of the naphthas with respect to paraffins is that which is expected from vertical tar. This, however, has no bearing on the present subject. An examination of these figures, together with those of the dehydrated tar, shows that separation is even worse than in ordinary tar distillation. This may be explained physically in this manner. The tar is heated to 230° to 250° C, and is under a pressure of about 50 lbs. When this tar passes into the vapour box, the pressure is suddenly released, causing the rapid evaporation of the light oils and a large proportion of creosote. With the decrease in pressure and temperature, much creosote is recondensed, dissolving a small proportion of the light oils. The pressures of the creosote in the vapour and the creosote in the tar will rapidly reach equilibrium; but the partial pressure of the light oils in the vapour will be much greater than the partial pressure of the light oils in the tar, which can be assumed to be almost *zero;* hence a slight redissolving action.

The construction and method of working these plants are known to all gas engineers; but an epitome of the general arrangements will probably be acceptable. The crude tar is pumped from a receiving tank through a coil A, 1½ in. diameter, passing through an economizer B, heated by the dehydrated tar, and from there passes through a coil C, 3 in. diameter and about 150 ft. long,



Diagrammatic Sketch of Dehydration Plant.

enclosed in a specially constructed flue D. From the top of the flue the pipe passes into the vapour box E, where the pressure due to the temperature acquired in traversing C is released, and the light oils and water are liberated. The dedydrated tar passes to the base of the economizer B, and there gives up the major portion of the heat to the crude tar in the coil A. The cooled tar is then pumped to the store. The vapours from E pass through a condensing coil F, surrounded by water in a tank G, and thence the oil passes into the receiver, where it is separated from the water.

Through the kindness of Mr. James Dickson, of the Johnstone Gas-Works, I have been enabled to run tests of the dehydration plant at the works.

FIRST TEST (4 hours).

Crude tar (mixed Johnstone vertical and Kilbarchan horizontal).

Total used, 349 gallons. Aver. temp., 105° Fahr.
Quantity per hour (av.), 87·25 galls. (Max., 107 galls.; min., 50 galls.)
Average speed of travel through coil 285 ft. per hour.
Time tar is exposed to heat 31·5 minutes.
Temperature leaving coil, 236° C. (Max., 240 galls.; min., 230 galls.

B.—*Light Oil.*

Recovered 192 gallons.
Water 19 ,, 9 p.ct. on oil *plus* water.
Rate of flow of oil only 48 ,, per hour (max., 79 gallons; min., 28 gallons).

C.—*Dehydrated Tar.*

Recovered 125 gallons.
Rate of flow 31·25 gallons per hour (max., 38 gallons min., 25 gallons).

TESTS OF MATERIAL.

	Crude Tar.	Light Oil.	Dehydrated Tar.
Sp. gr. at 60° Fahr.	1·080	1·002	1·16
Viscosity	—	—	66 sec. (Hutchinson)
Distillation—			
	P.Ct.		P.Ct.
Water	6·77	—	*Nil.*
To 170	9·28	—	*Nil.*
170 to 270	23·02	—	12·2
270 to 315	9·86	—	10·8
Free carbon	5·23	—	6·27

The oil from above to 315 was analyzed and gave:

ANALYSIS.

Sp. gr. at 60° Fahr. 1·010

	P.Ct.	P.Ct.
Tar acids	27·0	23·0
Pyridine	7·0	2·0
90's benzol	1·0	Trace
90's toluol	1·5	0·05
Solvent	3·5	1·75
Heavy naphtha	6·7	3·00
Creosote	52·3	67·2
Loss on working	3·0	4·0
	100·0	100·00

SECOND TEST (4 hrs. 40 min.).
Crude tar—as before. Temperature, 146° Fahr.

A.	Total used	407 gallons.
	Rate of flow	87·2 gallons per hour (max., 98; min., 60).
	Speed of travel through coil	285 ft. per hour.
	Time exposed to heat	31·5 min.
	Temperature on leaving coil	243° C. (max., 250 gallons; min., 235).
B.—*Light Oil.*		
	Total oil recovered	224 gallons.
	Water	22 ,, = 9 p.ct. on oil and water.
	Rate of flow oil only	48 gallons per hour (max., 74; min., 20).
C.—*Dehydrated Tar.*		
	Total recovered	175 gallons.
	Rate of flow	35·3 gallons per hour (max., 50; min., 24).

These two results generally agree. The slight excess in the quantity of tar in the second test can easily be accounted for, as probably some tar remained in the plant from the first run. The characteristics of the dehydrated tar made are of the greatest interest, as showing the general effect this mode of working has on the free carbon. The free carbon in the crude tar made at Kilmarnock, which I obtained through the kindness of Mr. Fairweather, was 5·001 p.ct. The free carbon in the refined tar from the same place was 6·01 p.ct. This indicates that the tar does not suffer from any breakdown in its passage through the coil. Cross showed in a recent paper (Feb. 17, 1917) that vertical tar was apt to suffer materially in this respect in the course of ordinary distillation, accompanied by a very large increase in free carbon—viz., 6½ times.

From this, it may be assumed that there is very little danger from pitching in the coil; and any occurrence of this nature could be attributed with certainty to neglect. The plants I examined were rated at 4000 gallons per twenty-four hours. The actual work being done is about 2100 gallons per twenty-four hours. When working horizontal tar, it is probable the first figure can be attained; but in working vertical tar, owing to the increased quantity of light oils present, coupled with the generally lighter gravity of the creosote and the low free carbon content, it is necessary to take out more oil. The most serious drawback, however, is the quantity of valuable products left in the dehydrated tar. The light oil also made in this way contains too much creosote, which lowers its value and increases the difficulty of subsequent recovery.

At many gas-works it is difficult to find continuous work for these stills. At Johnstone, however, the plant is used for the liberation and recovery of benzol from benzolized creosote, which effects a considerable saving.

Wales and Monmouthshire District Institution.—There will be a meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers on Wednesday of next week, at Briton Ferry, the home of the President (Mr. J. Mogford), who will deliver his Inaugural Address. There will also be a paper by Mr. W. H. Cattell, of Swansea.

A German Dyestuffs Combination.—Referring to the rapid growth of the United States dyestuff industry during the war, the American correspondent of the "Chemical Trade Journal" says that serious attention has been given to this movement by the German concerns formerly controlling the market, and has assisted in uniting these great rivals in Germany for mutual protection. A combination has been formed of the seven leading manufacturing concerns; and particulars available show that "a formidable understanding has been reached between the manufacturers of dyes and colours which cannot fail to affect future prices and the export policies to be followed after the present war." Reviewing what has been accomplished in Germany, he points out that the Badische Anilinfabrik has since 1913 so successfully applied the Haber process of extracting nitrogen from the atmosphere and production of synthetic ammonia and sulphate of ammonia therefrom, that while the ammonia output amounted to only about 30,000 tons in that year, it increased to 60,000 tons in 1914, to 150,000 tons in 1915, and to 300,000 tons in 1916, with an estimated figure of 500,000 tons for 1917.

Ammonia from Gas Liquor.—The "Chemical Trade Journal" a week ago contained an inquiry from a correspondent who said he was desirous of preparing liquor ammonia by direct distillation from gas liquor, and found that two methods were advised for the prevention of colour in the liquor, due to empyreumatic oils—viz., by passing the ammoniacal gas through charcoal, and by washing it with oil. The charcoal he had tried, without success; and he wanted to know what kind of oil should be used for the purpose. Replying in the current issue, Mr. B. Dunglinson (for Messrs. Blair, Campbell, and M'Lean, Ltd.) says: "In our process for manufacturing pure aqua-ammonia (of, approximately, 35 p.ct. strength), we have certain purifying towers which are packed with charcoal and oil respectively; the object of the charcoal being to retain H_2S and noxious gases which have a tendency to form ammonia polysulphide, and impart a yellow colour to the resulting liquor. The object of the oil is to absorb empyreumatic oils, usually pyridine and its homologues; and for this purpose a petroleum oil is quite satisfactory—say, a 'solar oil' or 'gas oil.' As a matter of fact, any of the petroleum oils boiling at (say) 250° C., are satisfactory for this purpose."

GAS FROM WOOD.

As several communications of late have shown, the scarcity and cost of coal on the Continent have driven many gas makers to substitute for it, as far as possible, supplies of such wood as could be used with reasonable success and was obtainable in the neighbourhood of the works. Perhaps the fullest particulars of actual working under these conditions which have been published are those contained in a paper read by M. Rothenbach, who is Manager of the Perouse Gas-Works, at a meeting of Swiss gas makers held at Vevey. The following is an abridged translation of this communication as recently published in the "Journal des Usines à Gaz."

The Perouse Gas-Works were laid out in 1912 for a make of 4000 cb. m. (141,000 c. ft.) per twenty-four hours. The occurrence of lignite beds in its neighbourhood prompted the erection in the first instance of furnaces adapted for burning this description of fuel. These were very tall generators, provided with a series of grids, and charged from the top. The charge of each was over 200 kilos (440 lbs.) of wood. Each generator supplied two furnaces, taking five retorts, and could be used for one or both furnaces, as required. With the growing cost of gas coal, the lignite was used in the retorts to the amount of some 400 tonnes, with fairly satisfactory results. Since then the abundance of oak in the neighbourhood of Pelouse has been drawn upon as a partial substitute for gas coal. The start was made with one part of wood to four parts of coal—a change which at once required one of the three purifiers to be charged with lime mixed with wood shavings, in place of oxide. With this small proportion of wood, no further change was found necessary. Subsequently, the consent of the Municipality was obtained to the distillation of other materials than coal; the company at the same time undertaking to keep the price of the gas to a reasonable figure. It was later on fixed at 33 c. per cb. m. [7s. 6d. per 1000 c.ft.]. After using a larger proportion of wood, it was found that the composite charge in the retorts was not a practicable system; and for over a year past wood has been used alone. Under these conditions the oxide in all three purifiers was replaced by lime, and attention was given to three difficulties chiefly experienced—viz., obstruction of pipes and hydraulic main with a hardened deposit of tar; the reduction of the labour and cost of cutting the wood to the required size; and the charging of the retorts and quenching the wood coke.

The wood is distilled at the normal temperature of the retorts, for from two to three hours according to the size of the pieces. The wood is cut in September, October, or November, and thus is fairly dry. It is obtained in pieces measuring about 3 ft. in length, and from 1½ to 5 in. diameter. Larger pieces, and those of less regular shape, are used in the furnaces. For distillation, the 3 ft. pieces have hitherto been used; but trials are being made of pieces from 12 to 20 in. in length, for the sake of more convenient handling, though the larger pieces seem better adapted for distillation. Also for readier handling, trial has been made of a trough-shaped receptacle of sheet iron, fitting the retort and allowing of the wood being pushed into the latter. Since the retorts are 10 ft. long and 25 in. × 14 in. section, their charging with 440 lbs. of wood at a time and by one man is heavy work.

The quenching of the wood coke on its removal from the retorts is a problem which has not yet been satisfactorily solved. Were it not that the use of wood was temporary, sheet-iron covered receivers would have been made for the purpose of quenching the coke by the exclusion of air; but in the circumstances the outlay did not appear justified. Thus the coke has been quenched like that from coal—giving a very wet coke, as well as one in very small pieces, owing to the breaking-up of the incandescent material on the application of water. Nevertheless, the coke has been sold at a price of nearly 9 lire per 100 kilos. [about 3s. 6d. per cwt.]. Containing some 30 p.ct. of water, it represents about 80 p.ct. of the production.

In the avoidance of stoppages in mains from hardened tar, it was found necessary to take measures diametrically opposite to those recommended by Reissig in his "Treatise on the Distillation of Wood." Instead of cooling the hydraulic, it was kept at a temperature between 85° and 95° C. by supplying it with the minimum of water. This allows the tar to flow to the water-cooled tubular condenser, which is kept at a temperature of from 65° to 88° C. At this temperature, the tar is still fluid, and passes to a large syphon boiler placed under the main coming from the the furnace-house. The syphon is emptied by reducing its 4-in. pipe to a length of 3 ft., and then letting the tar pass to its tank in an open channel. This was necessary owing to the tendency of the tar to adhere to the sides of a pipe and so give rise to stoppages.

The denser portion of the tar having been removed, the gas is very rapidly cooled in an atmospheric condenser, by which the more volatile elements of the tar are condensed to a strongly acid aqueous liquid, containing considerable quantities of acetic acid. The Pelouze and Audouin washer was left in action, although scarcely anything was condensed in it.

The chief problem, however, was the removal of the carbonic acid, present at times in the proportion of 30 p.ct. and averaging 28 p.ct. Although it was found that dry lime in the purifiers absorbed practically the quantity of carbonic acid which it should according to theory, experience pointed to a supplementary method. With dry lime in the purifiers, it was necessary to

charge a purifier each day; and it was hardly possible to avoid this re-charging on Sundays, even when the make did not exceed 900 cb.m. per day. Trial was, therefore, made of washing the gas with milk-of-lime. Of the two washers used for this purpose, the first was of a very primitive type. It consisted of a main, 23½ in. diameter and 10 ft. long, fixed to a base and fitted with a raised bottom for the inlet and outlet of the gas. It was filled with pieces of wood about 1 ft. in length. A syphon on the cover admitted the milk-of-lime. The second washer was of the "Standard" type, with a base about 11 sq. ft. and 11 ft. in height. The interior grids had to be removed, as they speedily choked with the precipitated chalk. The best results were obtained only after replacing the grids by lengths of wood on which were laid fine branches almost completely filling the apparatus. The milk-of-lime was produced continuously with a mechanical stirrer, and circulated through the two washers by means of a small pump without an intermediate tank. Keeping a strength of 4° to 6° Baumé in the mixer, 300 kilos [660 lbs.] of quicklime sufficed to wash the gas throughout twenty-four hours. One advantage of this wet method which cropped up afterwards was that the chalk from the washers could be disposed of for building work. The labour involved in the process was almost *nil*, in comparison with the dry purifiers.

In dealing with the carbonic acid, it was found that the quantity in the gas varied greatly with the quality of the wood and with its condition of moisture. Very great differences were likewise found in the action of different makes of lime. A lime which was almost brown worked well in the purifiers, but not in the washers; while a white lime, which worked well in the washers, was much less efficient in the purifiers. So far, no reason has been discovered for these differences. As showing the stages of removal of carbonic acid as the gas passes through the washers and purifiers, the following figures are quoted: Crude gas, 18 p.ct. of carbonic acid; after washer No. 1, 16·2 p.ct.; after washer No. 2, 13·8 p.ct.; after purifier No. 1, 13·6 p.ct.; after purifier No. 2, 11 p.ct.; after purifier No. 3, 0·4 p.ct. The temperatures in the three purifiers were respectively 28°, 35°, and 46° C. In some cases the action of the lime in the purifier was so considerable that the temperature rose to 52° C.

In regard to the yield and quality of gas, an average production was 30 cb.m. per 100 kilos. [540 c.ft. per cwt.] of wood; each retort yielding 350 cb.m. [12,500 c.ft.] per twenty-four hours.

Analyses of the gas showed its composition to be: Carbonic acid, 1·4 p.ct.; benzol and unsaturated hydrocarbons, 3·9 p.ct.; oxygen, 0·7 p.ct.; carbonic oxide, 35·7 p.ct.; hydrogen, 36 p.ct.; methane, 20·3 p.ct.; nitrogen, 2 p.ct. In the absence of a calorimeter, the calorific power (calculated from analysis) was estimated at 4899 calories.

The experience of consumers has been that the wood gas differed very little in lighting and heating effect from that from coal. At a Red Cross Hospital, where gas was the only fuel used, readings of the meters were taken each week by the company, and showed that the consumption of gas per person per day was exactly the same as when coal gas was burnt in the same appliances. Though consumers at first generally expressed the view that the wood gas would be deficient in heating power, they speedily realized that this was not the case.

The wood tar produced is of two distinct kinds. That condensing quickly is of a highly tenacious and viscous nature, though containing about 15 p.ct. of water. After getting rid of the water, a pitch results of such consistency as to command a sale among dealers in ship-building goods. The yield is about 1 p.ct. of this hard tar. The second description of tar, although more fluid, adheres strongly to the sides of its containing vessel. On distillation, it behaves somewhat peculiarly—breaking-up sharply into three fractions. The first of these fractions comes over at an almost constant temperature of about 92° C. Approximately a third of it is an oil of dense appearance, but of almost exactly the same specific gravity as the aqueous liquid mixed with it. The quantity of this fraction varies greatly; some tars yielding twice as much of it as others. Both the watery and oily portions of it are first of a light reddish colour, but quickly become dark brown on exposure to the air—no doubt as the result of the presence of pyrogallic acid. The whole of this more fluid tar has been requisitioned by the Italian Government, although it contains very little benzol.

The second fraction, coming over at from 130° to 195° C. and then fairly steadily at 188° C., is of clear brown colour, with a much less penetrating odour than the first. The oil obtained at from 130° to 195° C. is heavier than water; and like that from the first fraction, it becomes deep brown on exposure to light and air.

The residue is a hard pitch, almost identical with that from the heavier tar. The aqueous liquids distilling with the tar have a strong acid reaction, due evidently to considerable quantities of acetic acid. The quantity has not, however, been determined, nor have any steps been taken to recover the acid in the crude or pure state, as it was not considered wise to make the outlay on equipment for operations which, it was fully hoped, would be temporary.

In regard to the use of wood as the fuel for the retort-furnaces, it was found that the required temperature was readily attained—in fact, attention was necessary to avoid too high a temperature. About 1800 kilos [3960 lbs.] of wood were burnt per twenty-four hours, sufficing for the distillation of 6000 kilos [13,230 lbs.] of wood. The fuel ratio is, therefore, not at all bad; while the wood ashes constitute another bye-product which is readily sold. Altogether in the distillation of wood, as in that of coal, there are no waste products. And M. Rothenbach's experience, as declared to his Swiss colleagues, leads him to the recommendation that in the critical position in which many small gas-works find themselves as regards supplies of coal, recourse may with success be had to wood in places where it can be had in plenty.

CONDITIONS OF THE FORMATION OF COKE.

An abstract appears in the "Journal of the Society of Chemical Industry" of a paper in the "Comptes Rendus," Vol. 164, pp. 906-8, by Messrs. G. Charpy and M. Godchot, who describe a method for studying the coking properties of coals quantitatively, and also the influence of temperature on the coking process.

The coal under test is powdered to pass a sieve of 120 meshes, and exposed to an atmosphere saturated with water vapour and at 18° to 20° C., so as to define the humidity of the sample. The powder, compressed under a pressure of 5 kilos. per sq. cm., is filled into a tube of fire-clay, which is securely closed at the ends with iron plates. The tube and contents are introduced into an electrically heated furnace of such dimensions that the temperature is not thereby appreciably depressed. Heating is continued an hour. The coke is produced in the form of a cylinder, 12 mm. in diameter and 20 mm. in height, which can readily be subjected to a compression test, the result of which is taken as a measure of the quality of the coke produced.

The results of experiments on three kinds of coal at different temperatures are given. The compressive strengths, in kilos. per sq. cm., are the mean values of six determinations, the extreme values of which are given in brackets:

Coking Temperature.	St. Eloy Coal.	Ferrières Coal.	Noyant Coal.
650° C.	19·85 (17, 22)	19·0 (17, 21)	100·0 (94, 105)
800° C.	32·90 (29, 36)	30·5 (21, 34)	93·6 (90, 98)
1000° C.	38·70 (35, 42)	45·0 (42, 49)	36·3 (33, 39)

The variations with temperature are thus much greater than the experimental error, and are not, it is interesting to note, always in the same direction.

On modifying the methods of heating, other changes are produced. Thus the Noyant coal, if heated for a time at 650° C. followed by a gradual rise of temperature to 1000 C., gives a coke having a compressive strength of 130 kilos. per sq. cm.; while the coke from the St. Eloy coal is not appreciably improved by the same treatment.

The authors advocate the determination for each coal of the thermal treatment which leads to the best results in the coke.

Government to Take Possession of Lead.—The Minister of Munitions gives notice of his intention to take possession, as from the 1st inst. until further notice, of all pig lead, whether virgin or remelted, old and scrap lead, and lead residues, situated in the United Kingdom, excepting all such lead as may be in the possession of, or due under an existing lawful contract in writing for future delivery to, a manufacturer for use in such manufacturer's own works, and all such lead as may be specially excepted under the written authority of the Minister of Munitions. The lead of which possession is thus taken will be paid for by the Minister of Munitions on delivery.

The Gas-Turbine.—For large powers, the turbine possesses many advantages over the reciprocating engine (such as small floor space, light weight, and even turning moment); it is also generally recognized that internal combustion is more economical than steam. One objection to a gas-turbine is that the temperature of the resultant gases would be destructive to the blades; but an experimental machine is an accomplished fact. A 1000 H.P. gas-turbine built in Germany in 1914 gave trouble in valve action; and the whole of the explosion chambers could not be used. In the ordinary gas-engine, the cylinder is a combined explosion and power chamber; but these functions are separated in an impulse gas-turbine. Ten pear-shaped explosion chambers are grouped regularly round the shaft, each fitted with entry and exit valves; and the operation is similar to that of a two-cycle gas-engine. Air is forced into each chamber in turn, followed by gas also under pressure; and when liquid fuels are employed, a spraying apparatus worked by compressed air is used. When the correct proportions have been attained, the mixture is fired by electric sparks passing between contacts; and combustion is followed by a rise in temperature and pressure. The hot gases escape from the outlet-valve through a conical nozzle, and the cooled and expanded gases impinge on the rotor, being assisted by a fan on the exhaust. After the pressure is spent, a blast of air scavenges the explosion chamber; the time being longer than in the reciprocating engine, and the result more satisfactory. The cycle is then repeated. The exhaust gases raise steam for supplying the fan, the air and gas pumps, and the producer.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Wandsworth Meeting and the Sliding-Scale.

SIR,—May I ask you to explain to your readers that I did not use the words you attribute to me as "in effect," but with quotation commas, "What are we to do?"

It is not in your usual fair spirit to print the words as if really spoken.

HY. E. JONES.

13, *Queen Anne's Gate, S.W., Sept.* 7, 1917.

[To those of our readers who do not appreciate that when the words "in effect" are used they signify, not that the words quoted are exactly those employed by (in this case) the speaker, but are a paraphrase or the "effect" of what was said, we are pleased to explain that the esteemed President of the National Gas Council did not use the precise words as we gave them. What he actually said, after Mr. Allard had spoken at the Wandsworth meeting, was: "What direction should the movement take? There is a great deal of criticism. But you would help me very much, as I am connected with the National Gas Council, by indicating the particular shape in which you would like this to go forward. I did not rise to make another speech, but you know you must put some tangible proposition forward." Those are practically the words that appeared in the third person report of the proceedings at the meeting as published last week. Upon the inquiry put to Mr. Allard, upon the reference to criticism, and upon the suggestion that the President would be helped very much by an indication of the particular shape in which the speaker would like the matter to go forward, we wrote: "But what can we do?" in effect asks the President. "It is all very well to criticize, but what would you suggest should be done?" Really we do not see anything in this which can be described as unfair. If any reader thinks otherwise with the facts before him, we shall be more sorry for that reader than for anything we have said in this particular connection.—ED. G. J.]

Low-Temperature Carbonization.

SIR,—I have read your correspondent's letter signed "Notanda;" and I should have been pleased to answer his questions, but I have made it a rule, from which I do not intend to depart, not to enter into correspondence without knowing at least the name of the person requiring information.

The chief object of my letter to you was to show by definite proof that the instructions in the circular of the Ministry of Munitions could not possibly be carried out successfully by any endeavour to increase the output of tar by reducing the temperature of carbonization. I believe that this fact is now universally acknowledged by all practical gas engineers.

I have already stated that I will make the results of our experiment public in due course, when some of the questions asked by your correspondent "Notanda" may be answered.

JOHN WEST.

Southport, Sept. 6, 1917.

[There are, we know, good reasons for the identity of "Notanda," in view of his references to the National Gas Council, remaining within our confidence. This, however, may be said, that he is not commercially associated with any system of carbonization (high or low temperature), though concerned in the practical working of high-temperature settings.—ED. G. J.]

The Counsel of the Council.

SIR,—In a state of turmoil and anxiety, I wrote a letter to you on Aug. 22 asking certain questions, and urgently pressing for some advice and guidance from the National Gas Council respecting their circular on low-temperature carbonization. But up to the present, I have not heard from them or seen a line on the subject in your columns emanating from them.

Many thanks, however, to you, Sir, for endeavouring to enlighten us again upon the subject; also to Mr. John West, the veteran scientific and practical engineer, who gives us all some exceptional facts and figures most suitable to our case and present pressing requirement. The writer personally thanks him for his very timely information and solid practical advice; and he is sure that all representatives of gas undertakings will also thank him for championing their cause in such a bold, conclusive, and reliable manner. As you say in your leading article, the facts that he presents are unanswerable.

Then in your issue of the 4th inst., there is found a letter from Mr. Blundell, of Macclesfield, giving the results of his daily working, which certainly confirm once again all that you, Sir, and Mr. West have said on this very important question; and Mr. Blundell, like most of us, wants to know who is responsible for all this blundering.

The writer can now enlighten you somewhat, as all the questions he asked in his letter have been answered. He met a member of the National Gas Council this week who was at the meeting when the decision was made to send out the noted circular from the Ministry of Munitions. He said that after the delegates from the Ministry had interviewed the Committee, the circular was immediately rushed through without many of the members having any opportunity of carefully considering such an important question. But one is led to wonder why the gas engineers present did not give the Chairman some sound, practical advice on such a vital subject. Then after a few days a form was issued by the Council asking a number of extraordinary questions that no engineers could answer from their technical experience. There seems to be something that requires investigation in the rumoured and the printed revelations concerning this matter.

As for the writer himself, you know that he has been doing his best towards helping to win the war; and he will certainly continue to do so (not by low-temperature carbonization as laid down in the fatal circular) but certainly on the counsel of our old veteran who advises managers to work at as high temperature as possible, so as to enable their undertakings to pay their dividends and, at the same time, to increase their output volume of both gas and tar.

A GAS ENGINEER WHO CAN NOW DO WITHOUT ANY ADVICE FROM THE NATIONAL GAS COUNCIL.

Sept. 6, 1917.

Preventing Naphthalene Stoppages in Mains.

SIR,—I would be very grateful if any of your readers, through your columns, could kindly give information of methods they have successfully employed on the district to evaporate the naphthalene solvent on their line of mains—such methods being independent of anything employed on the works.

ENQUIRER.

Sept. 6, 1917.

REGISTER OF PATENTS.

Gas-Heated Soldering Iron.—No. 108,051.

TILLEY, F. C., of Kingsland Road, N.E.

No. 11,662; Aug. 17, 1916.

In this gas-heated soldering iron "the bit can be readily removed and a new one substituted, a better combustion of gas is ensured (consequently a greater heating effect therefrom is obtained), and the handle is kept much cooler than with those at present constructed."

The patentee claims a gas-heated soldering iron comprising an air-tube having holes for the entrance of air; a gas-tube having a nipple and positioned within the air-tube and held therein by a star or open wheel at one end and a screw nut at the other; a handle surrounding the air-tube and held thereto; a tubular mixing-chamber connected to the air-tube; a tube having a holed flange connected to the tubular mixing-chamber and carrying the nozzle; a hollow bit having a flanged end; and a screw-threaded collar engaging the bit and the holed flange of the tube to secure the bit in place.

Manipulating the Doors of Ovens, Furnaces, &c. No. 108,236.

BLYTHE, E., and ARMITAGE, C., of Dewsbury.

No. 13,728; Sept. 27, 1916.

This invention relates more particularly to apparatus for manipulating the doors of bye-product coke-ovens; but it may serve in applying the quencher to such ovens after the removal of the doors, or for manipulating the doors of other ovens, furnaces, or the like.

The apparatus is mounted upon a truck travelling on rails over the top of the oven doors—being prevented from tilting during operation. A further truck or bogey travels within the main truck, having its movement and position controlled by chains, chain wheels, shafts, and a lever. Mounted upon the bogey is a gantry supporting a moveable carriage from which is suspended a screwed hook-bolt connected by chain with the eye-bolt of the oven door. This carriage is also moved and controlled upon the gantry by a chain, chain wheels, and a hand lever. By operating the screwed bolt, the door is raised sufficiently off its bearing to permit of its transportation, which is effected by the carriage being moved outwardly upon the gantry carrying the door with it until the latter is past the customary buck-stays and gas-pipes of the oven. It is then moved horizontally and transversely by the movement of the bogey along its track within the main truck, as before-mentioned—bringing the suspended door opposite the door of the next oven, where it may be allowed to remain pending the discharge of coke from the opened retort.

Compositions Containing Pitch or Solid Tar Products.—No. 108,368.

DAVIES, G. L., of High Holborn, W.C.

No. 11,551; Aug. 15, 1916.

This invention has reference particularly to the treatment of the solid of very viscous tar products obtained by the process described in patent No. 16,908 of 1909. The object aimed at is to provide a composition consisting of tar products and solvents which can be utilized with little heat, or without the application of heat at all by dissolving the solid tar products obtained in the prior process referred to in cresols or a mixture of cresols and tar naphthas, and by these means obtain liquid or plastic compositions whose viscosity depends upon the relative proportions of the tar products and solvents employed.

The preferred solution consists of 90 p.ct. of tar naphtha and 10 p.ct. of cresylic acid; and an effective roofing composition consists of 50 p.ct. of the solid tar product, 45 p.ct. of tar naphtha, and 5 p.ct. of cresylic acid. These compositions can be easily applied to the roof of huts, fences, or the like, and when the volatile solvents have evaporated the tar products are left as a hard protective surface, which will be weather-proof and durable.

Gas-Heating Stoves.—No. 108,500.

FLEISCHER, J., of Stuttgart, and HAEGELE & ZWEIGLE, of Esslingen on the Neckar, Germany.

No. 10,190; July 19, 1916.

This is a modification of patent No. 100,114 "comprising three groups of heating tubes lying one behind the other." Owing (say) to lack of space these stoves cannot always be conveniently accommodated; and the main feature of the present improvements consists in "a rearrangement of the three groups of heating tubes side by side in a single row thereby constituting a one-rowed stove of the same heating effect, which can be erected in position where the available space is limited." Other improved features include the special formation and the jointing or seaming of the heating tubes, and the provision of means for leading off condensation water.

Gas-Burners.—No. 108,502.

TURNER, E., of Urmston, near Manchester.

No. 10,595; Jan. 29, 1917.

These gas-burners are of the multiple burner orifice type, in which the gas is led to an inner chamber, whence it issues from outlets (distributed over its area) into a second chamber, provided with burner orifices, so as to maintain a substantially even pressure at all the burner orifices or nozzles; the object of the invention being to provide for the regulating of the pressure along the length of the burner.

Such burners, the patentee states, are usually of tubular formation; and, according to his invention, the inner casing is movably mounted within the outer casing—the construction and arrangement being such that the position of the outlet orifices in the inner casing can be varied relatively to a blank surface in the outer casing, whereby the back-pressure on the orifices, or a portion of them, may be varied, so as to vary the rate of flow of the combustible mixture through the orifices.

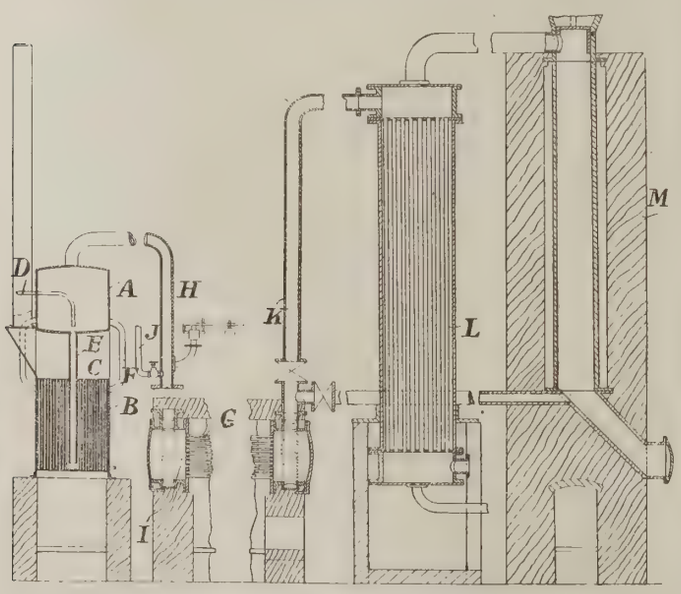
Production of Toluol, Benzol and Other Light Hydrocarbons from Heavy Oils.—No. 108,508.

ANDERSON, W., of Helensburgh, and MEIKLE, J., of Maryhill, Glasgow.

No. 11,033; Aug. 4, 1916.

This invention relates to apparatus for obtaining toluol, benzol, and other light hydrocarbons from heavy or dead-oils, such as creosote oil or blast-furnace oil, by distillation of the oil under pressure, followed by transference of the vapour obtained by distillation to a superheater, and superheating it along with steam—"the decomposition being the consequence of superheat, as distinguished from reaction in the presence of a catalyst."

In practice, the oil is first subjected to distillation under pressure—say, upwards of 10 lbs. per square inch above atmospheric pressure. The distillate, still under pressure, is transferred to a superheater, and superheated along with steam; the superheater being maintained at a temperature of about 1000° Fahr., so that the vapours are decomposed into various compounds, consisting principally of toluol, benzol, and their homologues. The condensible constituents may then be collected in a condenser at atmospheric or sub-atmospheric pressure.



Anderson and Meikle's Hydrocarbon Recovery Plant.

The apparatus (as shown) comprises a still constituted by superposed drums A B separated by a combustion chamber C. The lower drum is traversed by fire tubes—a downcomer E being led from the upper drum to the lower end of the lower drum, preferably centrally of the drums. Return tubes F connect the upper end of the lower drum with the lower end of the upper drum. The feed pipe D is preferably coaxial with E. The superheater connected to the drum A by a pipe H, and coupled to a steam supply pipe J, is constituted by tubes G expanded into headers I. As is evident, steam is thus admitted to the superheater together with the oil vapour from the still. The superheater has also a connection K with the condenser L. M denotes a retort to which the vapours from the superheater may be led, as described in the following patent, No. 11,034.

Carbonization of Coal.—No. 108,509.

ANDERSON, W., of Helensburgh, and MEIKLE, J., of Maryhill, Glasgow.

No. 11,034; Aug. 4, 1916.

This invention relates to apparatus for carbonizing coal and other carbonaceous matter, by retorting it in the presence of hydrocarbon vapour at a high temperature—an operation effected as described in the above patent, No. 108,508.

Referring to the illustration there given, the retort M is interposed in a bye-pass connection between the condenser L and the superheater, comprising tubes G expanded into headers I, through which are led the steam and distillation products from the still provided with the oil inlet D—there being preferably introduced an expansion chamber between the retort and the condenser L to receive the heavier hydrocarbons and tarry matter.

While part of the total volume of vapour emerging from the retort will condense in the condenser, the residual gas will be available for the same uses as coal gas, and the carbonized product "will be of high value."

Gas-Cooking Stoves and Ranges.—No. 108,518.

NEWELL, O., and O'BYRNE, P., of Dublin.

No. 11,174; Aug. 8, 1916.

This invention relates more particularly to that already-known kind of appliance consisting of a metal ring or band for placing on the stove so as to concentrate the heat of the burners on to the bottom of the cooking utensils and thus increase the heating capacity of the stove and correspondingly decrease the consumption of gas.

Heretofore the rings or bands have been made of flat metal strips, and the present "invention" consists in making them with corrugations across their width. The ends of the metal strip lap over one another so that the size of the ring will accommodate (within certain limits) utensils of more than one size; the ends of the strips being retained in position by a bolt passing through one of a number of holes provided in the ring.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 5.]

Nos. 12,237—12,595.

ALLEN, E.—"Flexible containers for transport or storing of gas. No. 12,528.

BRITISH RUBBER MANUFACTURES, LTD.—"Gas-containers and connections for adapting engines of automobiles for drive by coal gas, &c." No. 12,589.

BROWN, J. H.—"Drying, purifying, &c., air and gases and oils and other liquids." No. 12,560.

BURNS, H. A.—"Separation of suspended particles from gases." No. 12,281.

CHILTON, A. H.—"Gas apparatus and utensils for cooking and heating." No. 12,392.

COLE, E. G.—See Allen. No. 12,528.

GIDDEN, W. T.—"Process for purifying trinitrotoluene." No. 12,282.

LONDON GENERAL OMNIBUS COMPANY.—"Storage systems for supply of gas to internal-combustion engines." No. 12,542.

MOORE, F. W.—"Storing gases." No. 12,444.

NITROGEN PRODUCTS & CARBIDE COMPANY.—"Destructive distillation of carbonaceous materials to increase aromatic bye-products thereof." No. 12,350.

PERKIN, F. M.—See Nitrogen Products Company. No. 12,350.

POLLITT, A.—"Apparatus for power, propulsion, and lighting by high-pressure gas." No. 12,467.

REEVES, J. W.—See British Rubber Manufactures. No. 12,589.

SCHROEDER, F. W.—"Incandescent gas-burners." No. 12,293.

SHAVE, G. J.—See London General Omnibus Company. No. 12,542.

SHORT, F. C.—See Moore. No. 12,444.

SIMON-CARVES, LTD.—See Brown. No. 12,560.

SINGER, L.—"Process for removal of tarry matter from ammonium salts." No. 12,547.

SINGER, L.—"Removal of sulphuric acid, tarry substances, &c., from gases." No. 12,549.

SPENCER, A. C.—See Allen. No. 12,528.

WHYMAN, A.—See Pollitt. No. 12,467.

The Directors of the Alliance and Dublin Consumers' Gas Company have declared a dividend at the rate of 4⅜ p.ct. per annum, or 4s. 4½d. per £10 share, as compared with 5½ p.ct., or 5s. 1½d. per share, last year.

The women engaged on the Products Plant at the Old Kent Road works of the South Metropolitan Gas Company last month entertained a hundred wounded soldiers in the Livesey Institute. An excellent programme had been arranged, one item of which was a substantial tea; and photographs taken on the occasion which appear in the current issue of the "Co-Partnership Journal" will be a valued memento for those who participated in it of a very enjoyable afternoon.

MISCELLANEOUS NEWS.

COAL FACTORS' PRICES.

Board of Trade Order.

The following is the text of an Order issued last week by the Board of Trade, and to be known as "The Wholesale Coal Prices Order, 1917."

In exercise of the powers conferred upon them by Regulations 2 (F) to 2 (JJ) of the Defence of the Realm Regulations and of all other powers enabling them in that behalf, the Board of Trade hereby order as follows:

1. The price at which a factor or merchant may sell coal in railway wagon or barge load or cargo to a consumer or to a retail coal merchant for re-sale by him from depôt or wharf or railway siding by retail to consumers or to hawkers or small dealers, shall, except as hereunder provided, not exceed the pit price chargeable by the owner of the mine at which the coal was produced, or in the case of washed fuel, the price chargeable for the fuel at the washery by the owner of the fuel by whom, or on whose behalf it was washed, in addition to the actual cost of transport (in which cost no charge shall be made by the seller of the coal in respect of office expenses, salaries, or other overhead charges or loss in handling) by more than the following amounts:

(*a*) Coal purchased by railway companies in Great Britain for consumption on locomotives 3d. per ton.
(*b*) Coal purchased by railway companies in Great Britain for other purposes ... ... 6d. ,,
(*c*) Coal consumed in national factories ... ... 6d. ,,
(*d*) Coal consumed in gas and electric supply undertakings in Great Britain ... ... 9d. ,,
(*e*) Coal sold to retail merchants in Great Britain for re-sale by them from depôt or wharf or railway siding by retail to consumers or to hawkers and small dealers ... ... 1s. ,,
(*f*) All other coal, including all coal sold for consumption in Ireland, 1s. 3d. per ton, except that where coal sold direct to a consumer not having rail or wharf accommodation, who makes his own cartage arrangements, is delivered in railway wagon by the factor or merchant in quantities less than 30 tons, the amount chargeable in addition to the price at pit or washery and the transport charges as above defined shall be 2s. per ton, unless the consumer has ordered not less than 500 tons of the coal in question for delivery over the following twelve months.

Provided that:

(i) Where coal is dealt with by more than one factor or merchant before reaching the consumer or retail merchant, the above amounts of 3d., 6d., 9d., 1s., 1s. 3d., or 2s. per ton respectively shall be divisible between the different factors and merchants; and each seller, except in the case of the final sale to the consumer or retail merchant, shall at the time of the sale inform the purchaser how much of the above amounts is included in the price, in order that the maximum price may not be exceeded.
(ii) In the case of washed fuel, where loss of weight in transit is borne by the factor or merchant, a charge may be made by the factor or merchant in respect of such loss by way of addition to the price per ton at which the fuel is sold to the consumer, not exceeding in any case 2 p.ct. of such price.
(iii) Where the seller himself provides water transport, otherwise than by the charter of a ship subsequent to the date of this Order, the transport charges shall not exceed the rate current at the date of this Order.
(iv) Where payment is not made by the consumer or retail merchant before the date on which payment is due to the original owner of the coal or within thirty days of delivery of the coal (whichever is the later), the factor or wholesale merchant may make a reasonable charge in respect of credit to the consumer or retail merchant.

Provided also that the maximum charges specified in this article, including the transport charges, may be increased or reduced by the Board of Trade, either

(*a*) Generally.
(*b*) As respects any particular class of business.
(*c*) As respects the business of any individual factor, merchant, or consumer.
(*d*) As respects any individual contract or sale.

2. All contracts for the purchase or sale of coal in the United Kingdom under which deliveries were being made or were due prior to the 10th of September, 1917, are hereby abrogated. Provided that, notwithstanding such abrogation, the seller shall, subject to any instructions which have been or may be given by or on behalf of the Controller of Coal Mines under the Coal Transport Order, 1917, or otherwise, continue to deliver to the purchaser, and the purchaser shall continue to receive, the coal during the period of the currency of the contract, and under the conditions and at the rates specified thereunder, unless otherwise agreed by both parties; and the price charged as from the 10th of September shall not exceed the price chargeable under the contract in accordance with the provisions of the Price of Coal (Limitation) Act and of this Order. Provided also that in no case shall the price be increased without the consent of the Controller of Coal Mines for the time being appointed by the Board of Trade, hereinafter referred to as the Controller.

Any party to such contract may apply to the Controller for the variation of or relief against any term or condition of such contract; and such application shall be heard and determined by the Controller in the same manner as any question may be determined under Article 6 of this Order, and that article shall apply accordingly.

3. If, in consequence of the provisions of Article 2 hereof, the price to be paid by any person to whom coal is delivered is reduced by any amount, the price to be paid by any person to whom the coal is delivered in pursuance of any subsidiary contract shall be reduced by an equivalent amount, unless the Controller otherwise orders.

4. This Order shall not apply to any sale of coal for export, or any sale of coal for the manufacture of patent fuel for export, or any sale of coal to be used on any ship.

5. No person shall sell or buy or offer to sell or buy any coal at a price exceeding the maximum price hereby fixed.

6. Where any dispute or difference arises between two or more factors or merchants as to the division of the amounts referred to in sub-paragraph (i) of Article 1 of this Order, such dispute or difference shall be referred to the Controller.

The Controller on such reference shall consider the cases of the respective parties and take their evidence in such manner as he shall deem most convenient, but shall give each party an opportunity of knowing and answering his opponent's case.

If the Controller deems it desirable to hear the parties *vivâ voce*, he may appoint a person to hear the evidence and arguments and report to him. The decision of the Controller shall be final and binding on all parties to the reference; and the Arbitration Act, 1889, shall not apply thereto.

7. If any person acts in contravention of this Order, or aids or abets any other person in doing anything in contravention of this Order, that person is guilty of a summary offence against the Defence of the Realm Regulations; and if such person is a corporation or company every director and officer of the corporation or company is guilty of the like offence, unless he proves that the contravention took place without his knowledge or consent.

8. The Controller shall be responsible to, and is hereby authorized by the Board of Trade to take all measures that are needed to give effect to this Order. He may suspend from time to time and for any period, and in any district or part of a district, the operation of all or any of the articles of this Order or parts thereof as he thinks fit, and may restore such operation. He may make such rules, and issue such instructions under this Order, as may be necessary to give effect to its provisions; and such rules and instructions shall be deemed to be part of this Order, and shall have the same effect as if they had been included in this Order.

9. (*a*) This Order may be cited as the Wholesale Coal Prices Order, 1917.
(*b*) This Order shall take effect as from the 10th day of September, 1917.

Signed on behalf of the Board of Trade, 5th day of September, 1917.

W. F. MARWOOD,
A Secretary of the Board of Trade.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

THE CHAIRMAN'S VIEWS.

The CHAIRMAN, in moving the adoption of the report and accounts, said the statement presented that day was one rather indicative of difficulties withstood than of success achieved. From the report it would be seen that there had been an unprecedented increase in the Company's business. On this they could congratulate themselves in one sense; but he need not tell them that such an abnormal increase in responsibilities in these days was something that brought with it a large amount of superadded difficulty and embarrassment. It was to be hoped that the business thus acquired would remain to them in great degree when the war was done with. It was also stated that the increase in the price of gas that had been forced upon them would reflect itself in a further reduction of 1 p.ct. per annum in the dividend for the half year to next December.

THE ACCOUNTS.

The total capital receipts amounted to £703,378. The capital per million c.ft. of gas sold stood as low as £446—the lowest figure it had ever reached. This was the one factor which had helped them to limit their misfortunes up to the present. In 1907, it stood at £600; and if they had had to deal with any such figure as that now, their case would have been vastly worse. This capital figure had been reduced in two ways—by the increase in the business and by the adventitious aid of the capital redemption powers, by which they purchased and extinguished their own stock. The latter provision did not associate itself with war circumstances, and so was in abeyance for the time being. The total amount by which they had increased the price of gas was 10d. per 1000 c.ft., from 2s. 8d. before the war to 3s. 6d. now. This was an increase of 31 p.ct. in the demand upon the consumer. On looking at the other side of the account, the fact transpired that the cost of coal had increased since the war by 125 p.ct. He was not even sure that this would be the limit of the fully-developed coal prices for the current half year. In so far as they might use oil, this commodity had increased by nearly 400 p.ct. The increased return from residuals was in nothing like *pro ratâ* relationship. The price of coke to-day was largely regulated by the operations of companies whose coal was costing only 50 p.ct. beyond what it did before the war. While their receipts had been over £27,000 more, the expenditure had risen £34,000; the profit being decreased by £7324. It had not been possible to maintain in these adverse circumstances the high figure for depreciation and maintenance which had characterized their accounts in the past. But the essential duties in these ways had been performed; and they were maintaining the degree of efficiency which would prevent them contracting liabilities as they went forward. In the profit and loss account, it would be seen that there was brought into account £38,726; and the profit for the past half year amounted to £18,977. After deduction of interest, income-tax, and dividend, the sum carried

forward was £31,803, which was a decrease on the amount brought in of £6923.

THE EFFECT OF A LOW STANDARD PRICE.

With regard to the current half year, this state of affairs would be met by the increase in the price of gas of 4d. per 1000 c.ft. from July 1, and by the wholly disproportionate sacrifice of the proprietors' dividend which the Directors could not avoid. This situation was really due to the fact that they had an improperly low standard price attached to the working of the sliding-scale. It was interesting to look and see how and why the standard price had been fixed in the past in regard to the sliding-scale. Having had a fair amount of both administrative experience and parliamentary argument in the matter, he thought he might put it shortly that the standard price was fixed by Parliament in the past at such a figure in relation to the cost of producing gas as would secure to the proprietor a reasonable expectancy of the standard dividend, while giving the administration of gas undertakings an inducement to add to this dividend by reducing the price of gas. But the first object in the mind of Parliament was to secure the standard dividend against everything but bad management. In the case of maximum dividends, the maximum price was put at a figure more distant from the reasonable selling price, because there was no expectancy of added dividends. It was perfectly obvious from this that the successful operation of the sliding-scale depended upon a fair standard price; and, as he had said, this standard was calculated upon what a company ought to be able to sell gas at under ordinary trading circumstances. If this were so, it certainly followed that, if the circumstances upon which this price was based were arbitrarily disturbed or destroyed, there were grounds for a demand for a readjustment of the standard to meet these destructive factors.

THE BURDEN OF SEA-BORNE COAL.

In fixing the price, Parliament were actuated by certain considerations. In setting the price for a small company, they gave them a reasonably high standard. In arranging the figure for a company dependent upon rail-borne coal, and not enjoying the then advantages of water-carriage, they gave them a higher standard price, because it was concluded that the balance of trading was in favour of those who had the water-way and the water freight to help them. Now, look at the subversion of conditions that had occurred. Those dependent upon rail-borne coal to-day had had to face a 50 p.ct. increase in the cost of their coal; while those dependent upon water-borne coal, by reason of which facility their standard price was put low, had been confronted with an increase of 150 p.ct. on their coal cost. Such a disturbance of the basis upon which Parliament granted the sliding-scale was a complete reason for its revision, if none other existed; for it was simply the misfortune of this most unfortunate war that a burden three times as heavy as on the others should have fallen upon those whom Parliament thought would in future be trading under the more favourable conditions. The different standard prices fixed for companies topographically close together, showed that there was a strong case for the revision of the sliding-scale, if anything like a universal and equitable application of the principle was to be established.

THE CHAIRMAN'S SUGGESTION.

It might be said that it was all very well to complain of these things, but had one any practical suggestion to make? Emphatically, he had. He would make the same suggestion as he had put forward some months ago through the Press, which he thought both practicable and reasonable. He meant that Parliament should be asked through the proper channel to establish a tribunal to consider the cases of extreme hardship that existed at the present time, and that they should be empowered to grant a neutral zone not exceeding 4d. above the standard price, so as to preserve the standard dividend. He never thought for one moment that the Company should not make some sacrifice. He was always clearly of opinion that the dividend above the standard rate would have to go; but he could not see why they should fall below the standard rate, when the gas industry at the present time was performing such huge service to the country, with great sacrifice in other ways. He utterly failed to see that practical difficulties existed in the way of giving effect to this. It was nothing like so complicated a matter as dealing with the calorific standard. There would not be so many undertakings to deal with. A great many companies had their standard so high that they would not need to trouble the tribunal at all; many were maximum companies, and in most cases protected by the larger margin afforded to such concerns; and there were many which were owned by municipalities. The dimensions of the parliamentary labour involved would thus be extremely small. He ventured to think immediate action was desirable; and this opinion was shared by those possessing a greater experience of parliamentary procedure than he himself had. They did not want to look forward to compensation for losses, if by immediate treatment they could get relief from what was an intolerable grievance. There were, he knew, difficulties in the way. He ventured through the Technical Press—and no industry had been better served by its Technical Press through all these troubled three years than the gas industry—to draw attention to the subject. The leading publication well and intelligently ventilated the matter; and then the first difficulty disclosed itself. There were intemperate and ill-considered views expressed that the whole of the extra dividend should be preserved by some such process as he had suggested, and that the shareholders should not make any sacrifice. To suggest that they should ask Parliament to preserve all the extra dividend seemed to him to convey the idea that, instead of seeking redress, they were anxious for the facilities of the profiteer; and he did not believe it would receive consideration. So the proposal was vitiated in its inception by these ill-considered and intemperate claims. The next great difficulty—and it was a very real one—was that Parliament would not be disposed to deal with this question if the big Metropolitan companies were excluded from such treatment. The sliding-scale had its inception in the Metropolis; and the Company that perhaps exemplified to the fullest possible extent the position of the sliding-scale was the largest in the world. Unless the latter could support some such application, it would materially detract from the claims of smaller undertakings who would be seeking relief. There was a third difficulty, which was that, in the darkest hour of their existence, the gas industry appeared to have no Association or Society capable of effectively presenting and urging its claims. It never wanted one more than at this moment; and such an organization was never more conspicuous by its absence. He understood that there was an organization; and he believed that members of the profession whose experience and talents would lead him to place the greatest confidence in them were not associated with it, or only nominally associated with it. On reading a description of this body, he saw it was to embrace commercial interests and municipal interests. Now, the commercial interests had their own troubles, and their own triumphs financially; and they were not likely to concern themselves with the matter he had in mind. Then as to the municipalities, if they were true to the interests with which they were identified, they would be hostile critics of any such movement as this, instead of sympathetic supporters. Therefore, he could not say that, when they most needed it, they had the body they should have—and in a certain modified degree did have some years ago—to look after their interests in this all-important matter.

THE EXPERIENCE OF AMERICA.

There were some dangers ahead. The sliding-scale undoubtedly was an ingenious and an effective method—effective principally in its special application to certain undertakings. In its comprehensive application he did not believe it was of any general value. He remembered some years ago a gentleman who came from the United States Government calling upon him and asking him to give him his views upon the sliding-scale. He did so, and having heard him the gentleman said he was very surprised, because he (Mr. Paddon) was the only person with whom he had spoken who did not enthusiastically applaud the principle of the sliding-scale. He (the Chairman) replied that he preferred the maximum principle. A little later he received a copy of this gentleman's report, and heard that on the strength of it the sliding-scale had been adopted in America. However, quite recently he had seen that those who had adopted it were cursing it "by bell and book," and taking the necessary measures to be free of it. When a principle was adopted upon mature consideration, it must have something wrong with it in its application if it failed to satisfy those who had taken it up. He was not against the sliding-scale; he believed it to be a good principle. But it must be periodically considered and adjusted, or in a great exigency like this it would be apt to almost completely sacrifice the interest it was intended to safeguard—which was a standard dividend to the industry. If this hardship were not dealt with, there would be a revulsion of feeling with regard to the sliding-scale. Companies would seek to raise future capital under maximum powers, and a valuable principle under certain circumstances might be lost. Their own Company were feeling the full brunt of it. In these times, it was extremely difficult for them to organize any method of getting relief; but he had felt constrained to address himself to the subject, because of the correspondence he had received from proprietors, who expressed most profound dissatisfaction with the sliding-scale, and who were entitled to know why it was in this particular case their interests had suffered so severely from its operation.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion.

Mr. CHARLES WEBB remarked that there was a reserve fund of over £60,000; and he asked whether this was not intended to equalize the dividends. Many proprietors, he thought, would have welcomed the deferring for another six months of the increase of 4d. in the price of gas, and the taking of any deficiency from this reserve fund.

Mr. A. W. OKE said he had always been a warm advocate of the sliding-scale. He suggested that there should be some practical outcome of the Chairman's remarks, and that Mr. Paddon should get in touch with some other companies similarly situated, with a view, if possible, to the promotion of a Bill in Parliament to secure a neutral zone of 4d.

Mr. SAMUEL SPENCER expressed the hope that it might be found feasible to move in the matter.

Mr. W. A. HOUNSOM said they were very greatly indebted to the Board and the officials for all they had done. The circumstances of this Company were so special and so peculiarly adverse that the presenting of such an account as they had before them was a matter for thankfulness. The question to which the Chairman had been referring had, he thought, been approached rather too much from the shareholders' standpoint. The question should be taken up on the broadest possible lines. It should be considered, not only from the shareholders' point of view, but from that of the consumers and the employees.

The CHAIRMAN, in reply, said the reserve fund existed for the purpose of making up deficiencies in dividend. The only question in the minds of the Directors was how soon they should have recourse to it. On the present occasion they had taken a deficiency of over £7000 out of the carry-forward; and it did not seem to them that they should take a greater amount than practically one-third of the sum required from any form of reserve at any one time. With the low standard price they now had, there would be no probability in the future of being able to restore to the reserve fund what they took from it. As to Mr. Oke's remarks, adjustment in these special circumstances was necessary. He did not wish to assail the principle, but to make it applicable to the exigencies of the present situation. The change to the calorific standard was accompanied by the provision that it should be subject to revision at the end of five years; and he was perfectly willing that any change in the sliding-scale should be similarly liable to revision within a reasonable period—one year after the war, if desired. They only wanted temporary relief, and temporary adjustment. Whatever lay in his power to do, he would do. They had considered the matter from the shareholders' point of view, because it was the shareholder who had suffered.

The motion was then carried unanimously.

THE DIVIDENDS.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends were declared for the half year at the statutory rates per annum of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 10 p.ct. on the original ordinary stock, and 7 p.ct. on the "A" ordinary stock.

The proceedings concluded with votes of thanks to the Chairman, Directors, Secretary, Engineer and General Manager (Mr. C. H. Rutter), and staff.

NORTH MIDDLESEX GAS COMPANY.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, congratulated the proprietors on the character of the statement presented to them. It was, he said, rather surprising to find how the result of the war varied in its application to companies under very similar conditions. If there was a category of gas undertakings which had as a whole come through the ordeal well, it would be those in the suburban districts to the north of London, though there were, of course, exceptions to this rule. So far as their own Company were concerned, the proprietors' interests had suffered not at all up to the present moment. It would be found that the accounts would repay a little examination. In the first place, the capital per million cubic feet of gas sold stood at £637. This was a figure to which he always referred, because it was far and away the most important item of the accounts. It was owing to the fact that they had this very moderate amount of capital employed in the business, that the subsequent figures were so favourable. Very little had been spent on capital account in the six months ended June 30—not so much, indeed, as had been written-off in depreciation. This was a satisfactory feature in times like the present. Turning to the revenue account, it would have been noted from the report that there had been an increase of over 10 p.ct. in the sales of gas. This was quite as much as they had wanted. In fact, it would have embarassed them less, and served their financial ends equally well, if the increase had been only half this amount. Since the outbreak of war, the price of gas had been increased 5d. per 1000 c.ft., which was equivalent to a rise of 12 p.ct. in the charge made to the consumer. Coal alone had cost them, roughly speaking, since the beginning of the war, 50 p.ct. more; and for oil, were they compelled to buy it (which fortunately, having by the exercise of foresight accrued a considerable store, they were not), the increased cost at the present time would be about 500 p.ct. Everything else, too, had gone up; and it was therefore gratifying to reflect that, by merely charging the consumer 12 p.ct. more than before, the Directors were able to come forward with such an excellent statement as that now before the meeting. The unaccounted-for gas was just under 6 p.ct.; and as the district was not entirely urban, this might be regarded as satisfactory. The total receipts from gas and rental of meters, stoves, &c., were more by £4663, and residual products had brought in £1315 more. The gross receipts were £5977 up; the additional expenditure being £4298; and the extra profit £1679. These results had been achieved without any sacrifice of due and proper provision for maintenance. Allowances to dependants of employees serving with the forces had increased, as the proprietors would have expected, and no doubt wished. It was pointed out that the war items, including the fund for wounded soldiers, air-craft insurance, allowances to employees to meet the increased cost of food, and allowances to dependants, in the aggregate amounted to 3d. per 1000 c.ft. in the price of gas. As to the profit and loss account, they brought £2797 in, and they took £3208 forward, or an improvement of £231. But they had carried £1000 to the renewal fund. For income-tax and excess profits duty they had paid £825. It was impossible to estimate precisely what the increase in the business would be. The Board counted on a small one, and had had a large one; and its usual effect on the standing charges had made the Company liable for a payment of some £400 to the Government. The Directors did not propose to repeat this, and had decided to reduce the price of gas from Oct. 1 to ordinary consumers 1d. per 1000 c.ft. He hoped the result of this would be to effect such improved relations with the consumers—if that were possible—as would redound to the credit of the Company in the future, and help them when these troublous times had passed away. The balance-sheet showed that they were well placed with regard to available cash. With reference to the current half year, he did not see that the proprietors need have any very great anxiety. There had been difficulties in getting coal, mainly engendered by the large increase in the business; and there were problems with regard to the method of manufacture which would best meet the interests of the Government, consistently with carrying on the business of the Company efficiently and economically. He had known the gas industry for the last thirty years in almost every phase; but he never knew it with less guidance than it was getting to-day. Most of their problems they had to deal with by their own intelligence and their own experience. He was certainly very disappointed with the way in which, as a whole, the gas industry dealt with the different problems of manufacture with which it was confronted. Very often proposals and suggestions were made to them which to the mind of a practical man were really farcical. They were all actuated with a sincere desire to comply with the national requirements; and few people, even among the gas investing public, knew how much the country was dependent upon the gas industry to-day for the carrying on of the war. Their own Company had responded to every demand made upon them; but they were entirely governed in what they could do by the obtaining of the raw material. He hoped difficulties in this respect would not increase during the present half year; but it looked as though they would. The Directors had done all they could to ensure a good supply of coal.

Mr. H. A. LERMITTE seconded the motion, which was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. S. A. SAMPSON, dividends were declared for the half year, at the rate of 5 p.ct. per annum on the preference capital, 11 p.ct. per annum on the original ordinary capital, and £7 14s. p.ct. per annum on the additional ordinary capital, all less income-tax.

The CHAIRMAN, proposing a hearty vote of thanks to the officers, said the results of the Engineer and Manager (Mr. Lawrie Trewby) were uncommonly good. It was a pleasure to know that they had preserved harmonious relations with the employees.

Mr. JOSEPH CASH, in seconding, said the fuel account and the make of gas were satisfactory, and the profits were exceptionally good.

The vote was cordially passed, and acknowledged by Mr. BURTON and Mr. TREWBY.

The Chairman and Directors were similarly thanked, on the motion of Mr. F. R. SMITH, seconded by Mr. W. G. BEAUMONT.

HARROW AND STANMORE GAS COMPANY.

A Large Increase of Business.

The Ordinary Half-Yearly Meeting of this Company was held on Monday last week, at No. 5, Great Winchester Street, E.C.—Mr. A. F. PHILLIPS in the chair.

Mr. CHARLES CHAMBERS, the Engineer and Manager, read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the results of the half year might be considered satisfactory. The quantity of gas sold was 197 million cubic feet—an increase of 27 millions on the corresponding half year, which was equal to 16 p.ct. The increase in the Stanmore part of the district was phenomenal; being no less than 36 p.ct., and was in some measure accounted for by the consumption at works providing material for the war, which consumption was supplied at a reduced price. The larger part of the increase was, however, due to the ever-extending use of gas for cooking and heating. While 126 new consumers had been obtained, the Company had fixed 198 cooking-stoves, 176 gas-fires, and 25 circulating-boilers on hire, and might have fixed more had fitters been available to do the work. In reviewing the revenue account, he might say that, as expected, the expenses had risen, especially those for coal, oil, and labour. The Directors realized that the cost of living had increased, and endeavoured to meet it from time to time by allowances to the employees. They were not, however, sufficient to meet with the men's approval; and further allowances had recently been made, with which the men should now be content. These increases would in future add considerably to the labour bill. Ever since the war, the cost of labour and raw material had continued to increase; so that the additional expenditure was far more than was realized by the small addition of 2d. per 1000 c.ft. to the price of the gas. While every endeavour would be made by the Directors to avoid a further rise in the price of the gas, it was evident, if these expenses continued to grow, the Directors would have no alternative but to increase the price. In the capital account, there was a charge of £1586 for meters and stoves. It had been the policy of the Company to charge new meters and stoves to capital, and write them off at the rate of 10 p.ct. per annum. It would be seen from the accounts that the amount written-off in this way for the past half year was £1244 more than that charged. The capital consequently stood at £1244 less than it did on Dec. 31 last. The capital was now equal to £674 per million c.ft. of gas sold—a reduction on what it was a few years ago. It was, however, well to consider that, with the increases in the consumption of gas, some parts of the manufacturing plant required additions—a work that would have to be taken in hand as soon as the times permitted. The receipts for gas were £32,166, or an increase of £4295 on the previous half year. Meter and stove rents realized £4247—an increase of £338; and residuals, £8506, or £1118 more. In the half-year's expenditure, coal cost £14,243, which was an increase of £2673, owing to the additional cost of coal, and 1638 tons more having been carbonized. Oil cost £455 less, because the quantity used was 15,363 gallons less. Coke cost more, owing to its increased value. Repairs were £4802, which was £704 more, due to additions to the plant for benzol extraction, expenditure on the coke-conveyor, and the replacing of one of the exhausters. Rates and taxes were £318 less, because the income-tax was properly charged in profit and loss account, instead of the revenue account, as had been the practice of the Company since its formation. The war allowances to employees and war service payments were £1144, which was £512 more. The other expenses remained much the same, though there had been a more careful apportionment of some. The result of the half-year's working was a balance of £9653, against £8353 the corresponding half of the previous year. With the balance of £3656 brought from the last account, and adding this half-year's balance and £65 interest, and deducting the interest on debenture stock and loans and income-tax (£2049) left a disposable balance of £11,325. The dividends recommended would require £6772, leaving £4552 to carry forward. There had been no addition during the year to the price of gas, which was only raised 2d. per 1000 c.ft. in 1915. As the Company had not paid the maximum dividends to which the proprietors were entitled, the Directors were able to recommend the usual dividends, which had been earned. The increase in the consumption of gas, though much of it had been supplied at a low price had been the means of helping the Company to maintain its position without any further addition to the price. The benefit, however, was not so considerable as it might appear, because there must be an outlay of capital in extending the works to meet it; and it was probable after the war the consumption of gas at the works supplying materials for the war would be greatly reduced. The management had been successful in maintaining a satisfactory stock of coal; but oil had only been obtained with the greatest difficulty, and the stock was low. Keeping the works provided with coal to meet the requirements of the district received the constant attention of the Directors. To comply with the requirements of the Government for benzol, the necessary additions had been made to the works, and so far the results had been satisfactory. The Company had obtained an Order under the Gas (Standard of Calorific Power) Act, substituting a calorific standard in place of an illuminating power one to enable them to carry on the process. The works and distributing plant had all been maintained in a thoroughly efficient state. In common with other gas companies, they had difficulties due to the men lost for military service. He regretted to say that three of their men had been killed.

It was a trouble they must cheerfully meet, and give their best services to the country's needs. The whole of the staff and all the employees had most loyally served the Company during the half year. When there had been a difficulty, they had been only too willing to overcome it; and, as a result, the half year had passed with everything working smoothly. No one could be very sanguine as to the future while the dreadful war continued, or what there might be to contend with on its conclusion. But there was every reasonable probability that the Company would be able to maintain its present position.

The VICE-CHAIRMAN (Dr. J. W. Lee Glaisher) seconded the motion, which was unanimously adopted.

Proposed by the CHAIRMAN, and seconded by Mr. A. M. PADDON, dividends were declared at the rates per annum of 5½ p.ct. on the 5 p.ct. ordinary stock, and 5 p.ct. on the 5 p.ct. preference stock, both less income-tax.

The CHAIRMAN proposed a vote of thanks to Mr. Chambers and the staff associated with him for the way in which they had conducted the business of the Company during the past six months. He could only speak most enthusiastically of all the work that had been done at Harrow. Mr. Chambers had been successful in selling close upon 13,000 c.ft. of gas per ton of coal carbonized; his economy of fuel had been very great; and he had had complete control over his men—the result being that all had been truly loyal to him.

Mr. SAMUEL CUTLER, SEN., seconded the proposition, remarking upon the success that had attended the efforts of the Engineer and Manager.

Mr. DARLINGTON remarked that the Directors made a wise choice in selecting Mr. Chambers to succeed the late Mr. J. L. Chapman.

The proposition was cordially passed.

Mr. CHAMBERS thanked the Chairman, Directors, and proprietors very much for their kind vote of thanks to the employees, staff, and himself. Appreciation was like lubrication; it did indeed make the machinery run smoother. As the Chairman had said, these were difficult times; and they had no doubt got more coming in the future. But they looked forward with confidence. If only everyone would pull together, and do his best, the Company would get safely through the troubled days ahead. The most perplexing thing was the increase in the consumption of gas. During the month just past, compared with the corresponding one of last year, the increase was 22 p.ct. This was not an easy matter to deal with. Perhaps it might interest the proprietors to know that the 16 p.ct. increase referred to in the accounts under review represented the total annual make of the Company when he came into their service 27 years ago. The make then was not 30 million c.ft.; but 16 p.ct. increase now represented over 30 million c.ft. It was not until 1903 they reached 100 million c.ft. But since that time they had about quadrupled the amount. This year the output would be 400 million c.ft., which was 300 p.ct. increase in fourteen years. It had required the constant thought of the Directors and the staff to keep pace with this condition of things. There was much to be thankful for in having around one those who gave loyal support. With few exceptions, he had been well supported, and this did make things easy going. They had good stocks of coal, the district was growing well, and if they could only get the war over, he was sure there was a great future for the Company, judging from the amount of business they had now to refuse. They were just on the point of having to send round circulars, saying that, in present circumstances, they could not undertake more work. They were inundated with orders, but could not possibly, with the shortage of men, keep pace with them.

Mr. R. S. BATHE proposed a hearty vote of thanks to the Chairman and Directors. He remarked that the balance-sheet was a most satisfactory one to all concerned.

Mr. W. RICHARDS, in seconding, said the vote was well deserved. The Directors had successfully coped with the difficulties, and had given the proprietors an excellent report and good dividend; and they were indeed all deeply indebted to them for what they had done.

The motion was cordially agreed to.

The CHAIRMAN heartily thanked the proprietors for this expression of their confidence.

STRETFORD GAS COMPANY.

The CHAIRMAN (Mr. W. A. Nicholls), in presenting the report and balance-sheet at the 129th half-yearly meeting of the Company, said the financial position was extremely satisfactory, despite the fact that large sums had been spent on the works and plant so as to keep them in a satisfactory condition. At no time during the half year had they been in difficulties in supplying as much gas as was required by the consumers. In fact, they had always been in excess of the demand, and were in the position of being able to work at least the next six months without any addition to the price; nor had it been necessary to withdraw anything from the reserve fund, as there was a balance in hand over and above what was necessary to pay the dividends. The working expenses showed an increase of £6900. On the other hand, gas-rentals and residuals were £7850 up; and the balance carried forward was £5581, against £5105 in 1916. After paying the dividends, the carry-forward was £1903, as compared with £1232 at the beginning of the half year. With regard to coal purchases, great difficulty had been experienced in obtaining offers, from the fact that no replies at all had been received to two sets of advertisements. But after considerable negotiations and correspondence, they had succeeded in buying all they thought would be required at a slightly better average price and quality. The Coal Controller had now upset these arrangements; and fresh contracts had to be made for a very considerable quantity of coal which had been ordered from the Yorkshire fields. Various Government Departments were constantly altering their requirements. The Company had up to a few months ago continued washing the gas with tar in order to produce the toluol needed. Then the Coal Controller asked them to reduce the use of coal, owing to difficulties in raising, which he said were beyond the control of the producers. This was after the Company had carried out the Government Department's wish, and erected a benzol and oil-washing plant at a cost of over £2000, and gone to the expense of approaching Parliament for power to use previously prohibited land. The proprietors would be glad to know that the Board had won the fight over the Provisional Order; and it had now passed the House of Commons. The next step by the Coal Controller was that the use of coal must be reduced by making as large a percentage as possible of blue water gas; and within a few weeks of getting this going, the plan was off, and gas-works were now to make more coal gas, carbonizing at a very low temperature in order to produce more tar and benzol. This meant a very much larger use of coal, as the make per ton must be reduced; and it involved employing a considerably increased amount of labour, which, of course, was very difficult to obtain. The Directors were still in negotiation with the Government as to the last orders; but the turning-point would be lack of men. Though the Board were always trying to obtain them, and had advertisements appearing in the local papers regularly, they had not so far succeeded in engaging a sufficient number.

The DEPUTY-CHAIRMAN (Mr. E. Hibbert) seconded the motion for the adoption of the report and accounts, and stated that the good feature was an increase in the gas consumption of 8 p.ct. The Company were helping in the production of war material, not only in the production of toluol and benzol, but also in the supply of gas for power purposes. The gas consumption in Trafford Park was over 30 p.ct. in excess of what it was in 1916. The Board of Trade had granted the Company's application under the Calorific Standard Act; and an Order had been issued which bound the Company to supply gas testing at 500 B.Th.U. gross. He thought this would be to the advantage, not only of the consumers, but also of the shareholders.

The adoption of the balance-sheet was supported by several shareholders, and unanimously agreed to.

A resolution was passed authorizing the Board to continue the usual subscriptions to Red Cross Hospitals; and a vote of thanks was accorded to the Directors and staff for the work in the past six months. This was replied to by the Chairman, the Engineer and Manager (Mr. H. Kendrick), and the Secretary (Mr. W. Blundell).

SALFORD GAS UNDERTAKING REPORT.

The report to the Council, for the past financial year, of the Salford Corporation Gas Committee (signed by the Chairman, Alderman F. S. Phillips) states that, notwithstanding the war, the number of consumers has slightly increased during the year. The sales of gas have, however, shown a decrease equal to 7·82 p.ct., due to the restrictions on private and public lighting, and to the earlier closing of licensed premises. The coal and cannel carbonized amounted to 131,455 tons, as compared with 157,579 tons during the previous years, and the quantity of gas made to 1,520,763,000 c.ft., as compared with 1,643,348,000 c.ft. for the previous year. The erection of the installation of vertical retorts at the Regent Road works is progressing more satisfactorily; and it is hoped that the installation will be completed and working early in 1918. The total number of cookers, ordinary and prepayment, on hire at March 31 was 17,620; and the total number of gas-fires on hire was 2747. These figures show a considerable advance on last year. The receipts from the sales of coke and sulphate of ammonia show increases. Coke has realized £6442, and sulphate of ammonia £1137, more than last year. Last year, 1,747,000 c.ft. of gas was supplied free of charge to hospitals and Belgian refugee homes in the borough.

In addition to the loss of revenue due to the large decrease in the consumption of gas, the expenditure has been exceedingly heavy, owing to advances in wages, increased war bonuses, additional payments to dependants of men on active service, a further advance in the cost of coal, and continually rising prices of all other materials required. Since the close of the financial year, the Council have granted a further increase in the war bonus to employees. It is also probable that there will be a further increase in the cost of all materials required during the current year; while there is no prospect of any increase in the value of residual products. Coke will most likely maintain the present satisfactory price; but, owing to the Government control, the prices realized for sulphate of ammonia will not be likely to advance over those of the last financial year. There is no probability of any immediate advance in the value of tar; pitch at present being a drug on the market.

Owing to these circumstances, and to the fact that the Committee have no reserve fund to meet the increased expenditure, they were reluctantly compelled to recommend the Council to increase the price of gas. The Committee's final recommendations were adopted by the Council on June 22.

1.—That from and after the reading of the meters for the quarter ended June 30, the discount of 4d. per 1000 c.ft. of gas hitherto allowed to consumers by ordinary meters within the area of supply be reduced to 2d.

2.—(*a*) That from and after the reading of the meters for the quarter ended June 30, the price of gas to all consumers by ordinary meters within the area of supply be increased by 2d. per 1000 c.ft.; and (*b*) that from and after June 30 the price of gas to all consumers by prepayment meters within the area of supply be increased by reducing the quantity of gas supplied for 1d. from 27·27 to 25 c.ft., the increase in price to commence from the date of the first collection of coins from each meter after June 30.

The make of gas per ton of coal carbonized was 11,569 c.ft., as compared with 10,429 c.ft. in the preceding year.

A small outbreak of fire occcrred at the Admiralty, where a defective electric circuit caused an outbreak in a corridor.

An installation for supplying gas to motor vehicles was started last week, at the Valley Road works of the Bradford Corporation.

NOTTINGHAM'S PROPOSED NEW PRICES.

The absence of both the Chairman and Vice-Chairman of the Gas Committee from Monday week's meeting of the Nottingham City Council, led to the postponement of the report recommending an increase upon pre-war rates equivalent to 6d. per 1000 c.ft., inclusive of an advance of 12½ p.ct. which has been imposed upon the general body of consumers since that period. Although there was no discussion, the recommendation of the Committee has naturally not been allowed to go uncriticized outside the Council Chamber. The difficulties in the present abnormal times are admittedly great; but in view of extra burdens which have been entailed by the district rate, and their inevitable augmentation if concession be made to further labour demands, it is suggested that gas consumers, who have contributed abundantly to the municipal revenue, may reasonably ask for further consideration. In this connection, it is being pointed out that during the last ten years of the working of the undertaking, thanks to admirable administration, the profits have never fallen below £103,713, and have established a record since Mr. John Wilkinson has had the managerial control—the figures rising from £106,595 in 1912 to £129,305 in 1913, £131,917 in 1914, and £130,083 in 1915. There was a fall to £125,887 in 1916, and to £105,357 last year. The gross profits for the decennial period here taken aggregated no less than £1,156,344; while within the same ten years a total of £350,000 has been voted in relief of rates.

It is urged that gas consumers, and especially those paying large accounts, are placed under inequitable burdens, contributing in a double measure to the district rate. But the grievance is obviously inevitable, so long as the gas undertaking is regarded mainly as a means for rate reduction, in which non-consumers share, alike with those who contribute towards the result.

ROCHDALE GAS CHARGES ADVANCED.

Price for Prepayment Meters Not to be Increased.—Gas-Driven Motors.

At the last monthly meeting of the Rochdale Town Council, Sir James E. Jones (in the absence of Mr. G. Walker, the Chairman of the Gas Committee) alluded to the recommendation of the Committee that the price of gas for all purposes should be increased by 4d. per 1000 c.ft. ["JOURNAL," Sept. 4, p. 435], making the present price for lighting 3s. 4d., subject to the usual discounts varying from 2d. to 5d. per 1000 c.ft., according to the quantity used. For purposes other than lighting, the charge would be 2s. 4d. to 3s. per 1000 c.ft., according to consumption. It was not proposed at this juncture to alter the price of gas to prepayment meter users, owing to the expense involved and the difficulty in securing the necessary labour. "Slot" consumers would, therefore, still receive 27 c.ft. for 1d., equal to 3s. net per 1000 c.ft.; but the number of these meters in use would not be further increased. The alteration in price would take place from the next quarterly inspection of meters, which meant that the two winter quarters would be affected by the advance. In round figures, this represented 60 p.ct. of the year's consumption. The proposed increase in price was estimated to yield an extra £5350, which would still be [as stated in the previous number of the "JOURNAL"] a small deficiency, even assuming that the consumption remained the same as last year and working costs were not increased.

After stating that the items for which provision has to be made included a debit balance of £2258 for 1916, extra cost of labour (£2600), and increased cost of carting (£700), Sir James went on to say that it was certain that the increased charges on the debt would be higher; but some reduction might be looked for on income-tax, as the disposable profits were less last year. No attempt had been made to do more than meet the various needs of the situation—an obvious allusion to the allegation of "profiteering" which was made against the Committee when an advance of 6d. was mooted to cover the present deficiency.

Replying to criticisms on the policy of the department, chiefly as to whether the Gas Committee could not remove the "anomaly" by which a consumer of less than 10,000 c.ft. had to pay on a higher scale than one taking over 10,000 ft., Sir James Jones said the matter had been gone into, but the Committee could not for the present make any alteration.

Alderman Diggle regretted that the Gas Committee could not find "a remedy for the anomaly whereby a person who consumed 9500 c.ft. was charged more than the consumer of over 10,000 c.ft." It was a provoking system which led to a great waste of gas, because in order to obtain the financial benefit of the arrangement some people let the gas "blow off" until they reached the 10,000 c.ft. rate.

Mr. Shawcross remarked that the Gas Committee should take a leaf out of the book of the Income-Tax Commissioners, who found means of surmounting a similar difficulty in regard to income-tax.

The Committee's recommendations were agreed to.

In reply to a member, Sir James Jones said the cost of converting a motor-van to gas-power was about £15. He had been told by a trader who had adopted this course that the adaptation paid for itself in about three months.

Mr. Bryning congratulated the Gas Committee's forward policy in regard to the use of coal gas for motor vehicles, and said he was informed that the cost of running by gas was only about a fourth of the expense of petrol. The Manchester Gas Department had given facilities to garages where motorists could re-fill with gas, and so not lose time. Having regard to the present shortage of petrol, he suggested that the Rochdale Gas Committee might very well provide accommodation at the gas-works where motorists could renew their power.

The matter was left in the hands of the Gas Committee.

Price of Gas at Portadown.—The Portadown Gas Company have increased the price of gas from 4s. 7d. to 5s. per 1000 c.ft.

DUBLIN DISTRICT GAS LIGHTING.

Allegations by Rathdown Councillors.

Arising out of a proposal of the Alliance and Dublin Consumers' Gas Company to take over the lighting of Stillorgan and Dundrum from the Rathdown (co. Dublin) No. 1 Rural Council, on terms which would lead to a saving of about £60 a year, Mr. James Collins, at a meeting of the Council, said that Mr. Grey and other Englishmen had control of the Company, and had dismissed some of the older officers, in view of which he asked what guarantee the Council would have that similar action would not be taken in regard to the Council's employees. In one instance, an officer of 25 years' standing had been dismissed without pension, though the Company had a pension fund of £25,000. It was, said Mr. Collins, desperate treatment to give a man because, as he said, of his political opinions. It was stated, he alleged, that the officer in question was brought before the Secretary and cross-examined about his political views, and that a short time afterwards the man was dismissed.

Mr. John Cullen said the officer had eight children dependent upon him; and he would not, in the circumstances, be in favour of handing over the lighting to the Gas Company, as he would not believe in any guarantee that might be given by them.

Mr. Barrington Jellett, J.P. (Acting Chairman), said he had heard that the Company ruthlessly dismissed hands employed by them.

Mr. Cullen observed that, not only had they done this, but from any really good position the old officer had been cleared out, and an Englishman brought over and placed in it. Was this fair? Were they, as Irishmen, so incompetent that they were not able to carry on a business like that? It was, he held, a disgraceful action on the part of the Gas Company to oust Irishmen, seeing that Dublin used the gas and Dublin money paid for it.

Ultimately, the Council appointed a deputation to wait on the Gas Company in reference to the lighting question.

THE SHEFFIELD EXPLOSION.

A Fatal Result.

Last Thursday formal evidence of identification and medical evidence were taken at an inquest held at the Sheffield Coroner's Court on Ernest Mottershead, one of the men injured in the explosion at the Grimesthorpe Gas-Works, reported last week, who succumbed to his injuries in the Royal Infirmary on the 5th inst.

Mrs. Louisa Mottershead, of Broughton, near Manchester, said the deceased was her son, 28 years of age, and formerly employed at an engineering works at Manchester. He joined the Army in the Royal Welsh Fusiliers, and later, on account of his eyesight, was transferred to a labour battalion of the South Lancashire Regiment. Subsequently he was sent to the Grimesthorpe Gas-Works, Sheffield. On the night of Aug. 27 she was sent for from Manchester, being informed that her son had been badly burned. She came to Sheffield the following day, and was with him until he died. He told her that, while loading coke, he was blown down by the explosion, that he got up again and ran, and was again blown down. He then crawled as far as he could on his hands and knees, having to pass in this way through the fire that was raging. He did not blame anybody for the accident.

Captain Wigram, the Resident Medical Officer at the Sheffield Royal Infirmary, described the condition of Mottershead when admitted to the Infirmary on the evening of the accident. He was extensively burned on the head, face, back, chest, arms, and legs. His condition was hopeless from the first. He died from burns and septic absorption—a condition arising from his injuries.

The Coroner (Mr. J. Kenyon Parker) intimated that some of the other injured men were in a critical state, and it was necessary to adjourn the inquiry for a week.

GAS-DRIVEN MOTOR VEHICLES.

Manchester Gas Committee's Enterprise.

Alderman William Kay, J.P. (the Chairman), presided at a fortnightly meeting of the Manchester Gas Committee, at which the Superintendent (Mr. Fredk. A. Price) submitted a report dealing with the question of gas-driven motor vehicles. The Committee decided to encourage the new enterprise by every means in their power.

After referring to the shortage and high price of petrol, Mr. Price stated that coal gas is now being used extensively in many towns for driving motor vehicles—notably in Blackpool. Several inquiries having been received from Manchester motor-vehicle owners, he communicated on the subject with Mr. William Chew (the Engineer and Manager of the Blackpool Corporation Gas-Works), and also requested Mr. William Barrett (the Acting Manager of the Manchester Corporation Private Lighting Department) to make inquiries in Manchester on the subject. Mr. Chew replied as follows:

We are at present filling a large number of gas-bags for motor vehicles. We have arranged a number of filling-points all about the works entrance. The motors draw up in the street and connect their bags to our pipes, against the buildings. Our filling-pipes are all gasholder pressure, to facilitate quick filling. We have one filling-point supplied through a 200-light meter, for testing the capacity of a bag the first time it is filled. Afterwards, they are all filled without registering. Exclusive of the meter, the cost of installing the pipes was only a few pounds.

Mr. Barrett's report was in these terms:

From inquiries I have made, I find that a small private company is being formed in Manchester for the purpose of supplying flexible gas-bags and cylinders, and fitting same to commercial motors, &c.; and they have orders

in hand for over thirty bags to be fitted to cars in the Manchester district. In an interview I had a few days ago with a representative of this Company, the question of re-charging was discussed; and he pointed out that, if the venture was to be a commercial success, it would be necessary to provide means in all districts for rapidly re-charging the bags. The bags are made in various sizes, according to the size and make of the vehicle—ranging from 300 to 1500 c.ft. capacity; and it is essential that the largest bag should be re-charged in not more than one hour. This means that a 250-light meter is required for the work; and as it is advisable to have a reserve, I suggest that a 300-light meter would be better.

In order that there should be a re-charging station in every district covered by the Manchester area of supply, it will be necessary to instal meters in each of the following districts: Town (1), Moss Side and Rusholme (2), Hulme, Old Trafford, Chorlton-cum-Hardy, Withington, Didsbury, Ardwick, Gorton and West Gorton, Openshaw, Beswick, Bradford, Clayton, Crumpsall and Cheetham, Harpurhey and Blackley, Levenshulme and Burnage, Newton Heath, Whalley Range and Stretford, Chorlton-on-Medlock, and Droylsden.

I suggest that these meters should be fixed under our supervision on the premises of garage proprietors, after the necessary permission has been obtained and suitable arrangements made. The garage proprietor should be authorized to supply gas as required, and charge for same at a price per 100 c.ft. to be fixed by the Gas Committee, and be responsible to the Gas Committee for the gas consumed as registered by the meter. The object of the Gas Committee in fixing the price per 100 c.ft. at which the gas is to be sold, is to ensure a uniform price throughout the district; to ensure the garage proprietor receiving a profit for his trouble and time in making connection to the bags and re-charging; and to prevent the garage proprietor charging an excessive price, and thus interfere with the use of gas for the purpose. Assuming that the gas will be charged to the garage proprietor at gas-engine rate—2s. 9d. within the city—I suggest that the garage proprietor should be authorized to charge 4d. per 100 c.ft. for re-charging.

I think this matter is worth consideration, seeing that the use of gas for motor purposes will be considerable in course of time. A great deal of interest is being taken in the question.

Mr. Price made the following recommendations, which the Committee unanimously adopted:

1.—That gas supplied from the Corporation premises for the purpose of driving motors be fixed at 4d. per 100 c.ft. net, and be paid for in cash at the time of the delivery.

2.—That the Gas Engineer be instructed to install suitable charging apparatus at each of the gas-works without delay.

3.—That, having regard to the prospective rapid development of the business, the Chairman (Alderman W. Kay) and Deputy-Chairman (Alderman R. Birtles) be authorized to make such other arrangements as they may from time to time consider desirable, and report.

No better place could have been chosen for one of the two Manchester town filling-stations than the old Whitworth Street West meter-stores, which are now utilized as the demonstration depôt, for showing to engineering and other firms the value and utility of gas in the heat treatment of metals for the manufacture of munitions of war, and for other industrial processes. Under the direction of the Chairman of the Gas Committee, facilities have already been afforded for filling bags at the Whitworth Street depôt. In the opinion of Mr. Price, it will be desirable, in addition to providing facilities at the Corporation depôts and works, to arrange with proprietors of garages to instal the necessary apparatus. It is claimed that 250 c.ft. of gas, costing 10d., is equal in propelling power to a gallon of petrol.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 10.

Inquiry for pitch is brisk, and the market continues firm. Makers' price is not below 45s. net in bulk at works. A fair number of shipments are being made. Solvent naphtha is scarce, and the price is firmer at 2s. 3d. to 2s. 4d. per gallon net and naked *ex* works. The Ministry of Munitions has now issued orders by which crude benzol and dehydrated tar will be brought under Government control as from the 1st prox.

Business in sulphate of ammonia for agriculture is brisk—both dealers and farmers wishing to take delivery of quantities this month in order to take advantage of the low price prevailing.

Tar Products in the Provinces.

Sept. 10.

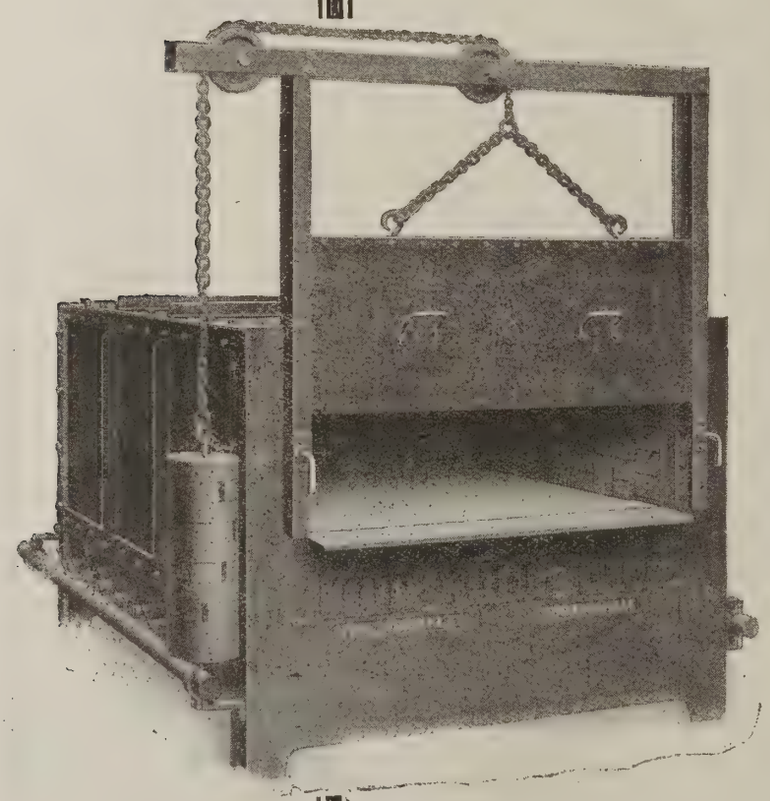
There is nothing fresh to report concerning the markets for tar products.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 11d. to 2s. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The number of products in which what may be considered a free market still exists is gradually becoming smaller; the latest to come



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under official regulations being coal tar, in which, after Oct. 1, dealings will only be permissible under licence. The order, of course, does not affect the distiller. Reference was made in last week's report to the order relating to crude benzol, naphtha, and light oils; but unfortunately comment thereon was somewhat ambiguous, and has given rise to the idea that naphthalenes also have been placed under official control. This is not the case at present, although rumour credits authority with the intention of assuming control almost at once. The existing regulations in this case affect only the export trade, where the system of licences has proved a great hindrance to business, as has before been pointed out in these notes; and in commenting on the naphtha and light oils order last week, the intended comparison was with the system of licences involved in each case rather than the orders themselves. Naphthalenes remain firm, with prices unchanged. Solvent naphtha is stronger again in the Provinces, and the heavy is also creeping up. Aniline oil is a shade harder, and an improvement is to be noted in cresylic acid; the lower prices of the past two weeks having proved attractive—indeed, the supply in some centres appears to be now rather on the short side. Benzol and toluol remain steady, and creosote is a purely nominal market in which the making of quotations is difficult, inasmuch as no idea is available of the Government's intentions regarding the price at which supplies will be taken over. Permits for sale, however, have been more readily obtainable of late. Considerable interest is still shown in the position of pitch, for which a good demand keeps up at or about 48s. per ton f.o.b. London. Provincial holders are awkwardly situated at present—a position of which some buyers have endeavoured to take advantage. Offers of 12s. to 14s. per ton have been made; but holders prefer the pitch to the money—the strength of the export situation encourages them to refuse such offers, which they characterize as ridiculous. They are accordingly adopting a Micawber-like attitude, and are waiting for "something"—in the shape of shipping facilities—"to turn up." Certainly they can do nothing at present, and, all things considered, their policy will probably pay, as in London buyers are already having trouble in the placing of their orders. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per gallon.

Benzol: 90 % London, 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d.; North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190 % 1s. 8d. to 1s. 9d.; North 1s. 2d. to 1s. 3d. per gallon; 90-160 % naked London 2s. 3d. to 2s. 4d.; North 1s. 11d. to 2s. 1d. per gallon.

Crude Naphtha: Naked 30 % 8¼d. to 8½d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 5d.; 97-99 %, 2s. 6d. to 2s. 7d.; Glasgow 2s. 2d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Permits for the export of further small parcels, mostly for British possessions, have been granted, and the quotation again shows a hardening tendency. The home demand continues in accordance with anticipations, and farmers evidently find the current official prices attractive—next month the quotation becomes automatically 10s. dearer—although manufacturers view the matter in an entirely different light, and consider they have been badly let down as the reward for their, in many cases, heavy capital outlay necessary to meet Government requirements. This, and the greatly increased cost of production under the headings of labour and raw material, appear to have received no consideration at the hands of the authorities, and manufacturers are practically compelled to sell at very little more than pre-war prices. Efforts are being continued to obtain recognition of their difficulties and, what is more to the point, fairer treatment from the Government; but so far the Committee appointed to deal with the matter have given no indication of the progress, if any, that has been made. In South Wales production is specially good, while orders are considered entirely satisfactory. Speaking generally, the home sulphate position is quite good. Farmers are rapidly learning its value as a fertilizer, and business during the autumn and winter may be expected to exceed substantially that of any previous year.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 17s. 6d.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

There is a better demand in the coal trade; but the scarcity of steamers still impedes the movement of the export branch. This is most felt by the steam coal collieries, which depend so largely on the oversea trades. Best Northumbrian steams are busy comparatively, and are about 30s. per ton f.o.b.; second-class steams are plentiful, and are quiet at about 25s. to 27s., according to class; and steam smalls are abundant, and are quoted from 18s. 6d. to 20s. In the gas coal trade, the demand is better, both on the local and the more distant

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contracts. There is a fair output, which is well taken up generally. Best Durham gas coals are quoted at 25s. per ton f.o.b.; for second-class descriptions the current price is about 23s. 6d.; and for "Wear specials" about 29s. to 30s. For the better class of coals, the demand is full; but second-class gas coal is relatively more plentiful. Freight is higher—19s., Tyne to London, having been paid as freight for gas coal—an advance showing the enlarged demand for tonnage beyond that under contract. To neutral ports, the rate for sea-carriage is at a record height. There is an increased output of coke; but it is well taken up in general. Good gas coke is fairly steady at from 29s. to 31s. per ton f.o.b. Coke freight is still based on about 45s., Tyne to Dunkirk.

A Gas Manager's Bonus.—At Newport (Fife) there is an advance in the price of gas of 2d. per 1000 c.ft., making the rate 4s. 5d. The Gas Manager is to receive a war bonus of 10 p.ct. on his salary.

Electricity Causes Dissatisfaction.—Reports to hand by the last mail are to the effect that the Council of St. Kilda (Victoria) have resolved to revert to the use of gas for the lighting of South St. Kilda; the electric service having caused dissatisfaction.

Stockport Gas Stokers' Pay.—In pursuance of their threat to cease Sunday labour unless their demands for increased wages were conceded, the stokers at Stockport have refused Sunday duty. The matter has, of course, been reported to the Chief Industrial Commissioner's Department.

Success of Vertical Retorts at Truro.—The report of the Directors submitted at the annual meeting of the Truro Gas Company stated that the profit of the year amounted to £1523, and with the amount brought forward from the previous year the credit balance was £1835. Dividends of 5 p.ct. on the preference shares and 4 p.ct. on the ordinary shares were recommended. Mr. J. Thomas suggested that the dividend on the ordinary shares might be increased if a less sum than the Directors proposed were written off on the suspense account. The Chairman (Mr. John James) replied that they would be running a risk if they increased the dividend further, for they could not say what was coming in the future. With regard to the past year's working, they had to congratulate themselves on the success achieved by the installation of vertical retorts. Mr. S. J. Ingram (the Engineer and Manager) said the effect of the diminution of public lighting, the restriction of private lighting, and the operation of the Summer Time Act had been a decrease in the output of gas of 2,250,000 c.ft. As compared with pre-war prices, the cost of coal had increased 75 p.ct.; and the larger profit made in the past year was due to the exercise of economy and the working of the vertical retorts, which had exceeded their expectations in every respect. If they had carbonized all their coal in horizontal retorts, they would have used 1000 tons more than they did. They had made contracts for coal on satisfactory terms. It was agreed to pay the dividends recommended.

Great Wigston Gas Company.—The half-yearly meeting was held at the Company's works on the 23rd ult., when the usual dividends of 10 and 7 p.ct. were declared. The Manager and Secretary (Mr. John A. Harris) was thanked by the Directors for the excellent results obtained, and unanimously granted an increase in salary of £25.

Alliance and Dublin Consumers' Gas Company.—The Dublin Corporation Paving Committee have approved of plans for a compressor-house at Great Brunswick Street for the Alliance and Dublin Consumers' Gas Company. The Committee reported to the Council that permission was given the Company to open ground at the Grand Canal Quay, opposite their works, to replace a main through which they drew a water supply from Ringsend Dock; but that, on its being reported that the Company had carried out work different from that for which permission had been granted, the permission was withdrawn, and the new pipe was ordered to be taken up.

Waterford Gas Company.—Mr. J. H. Sugrue, presiding at the annual meeting of the Company, said that before the war they had a healthy increase each year; but since the conflict started, the business had shrunk to less than it was in 1909. The high price of coal had necessitated a higher price of gas; and this was always attended by a falling-off of business. Gas companies in Ireland, and particularly in the South, were very hard hit in consequence of the enormous freights which had to be paid. In England the limitation of the price of coal had been of benefit to the gas undertakings; but the Irish companies had to pay more for coal than their friends in similar circumstances across the Channel. In Waterford, they had about 2000 gas-cookers in operation, and 250 fires. They looked for a considerable increase in the number of gas-fires in the coming winter, owing to the price of coal. Resolutions were passed approving of the report and accounts, and declaring the statutory dividend.

Lichfield Council and the Gas Company's Charges.—The Lichfield City Council have again considered at a special meeting the question of the Gas Company's charges. At the previous meeting the Council decided that they would not pay the charges, amounting to £218 per annum, less discount, according to an arrangement between the Streets and Highways Committee and the Company, until some explanation had been given them. Now, after having a letter from the Gas Company on the subject, the Committee adhered to their recommendation that the Council should pay. The Town Clerk said the letter gave details as to how the £218 was arrived at—one year's interest on the capital value of the lighting plant, £77; and maintenance, depreciation, rates and taxes, and painting for twelve months, £141. After some discussion, the recommendation to pay the money was again referred back to the Committee, in order that information may be obtained regarding the Council's legal position, and the probability of them being surcharged by the Local Government Board if they pay. It was stated that the Committee were fully satisfied that the charge was a fair and reasonable one.

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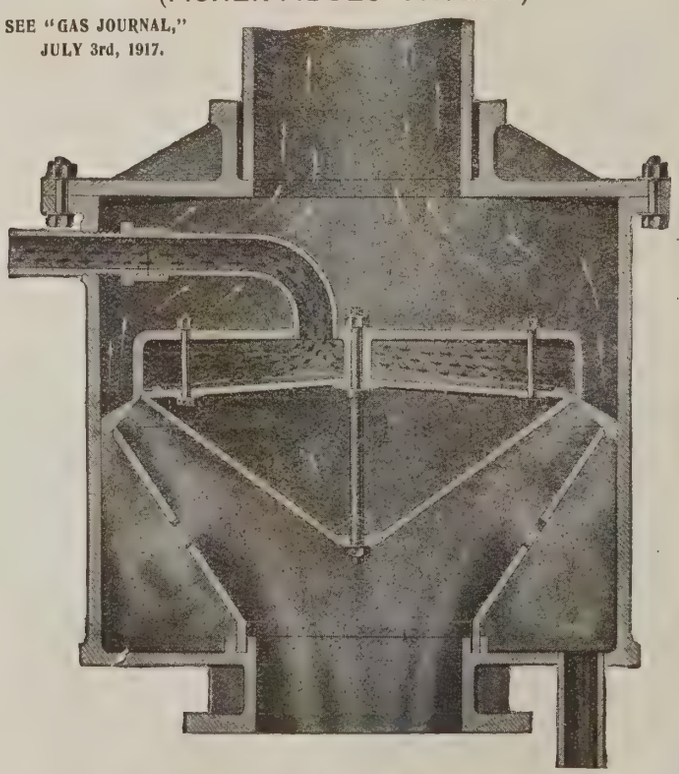

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Lurgan Gas-Works under the Council.

At a meeting of the Lurgan Urban District Council, the Auditor's report on the working of the gas undertaking for the fifteen months ended in March last—being the first period of the Council's controllership—was submitted. It gave the gross profits at £3540, against which was charged interest upon loans and bank interest, amounting to £2688, together with sinking fund contributions for the redemption of debt to the extent of £1233, leaving a net profit of £8. The Chairman (Mr. H. G. MacGeagh, J.P.) said the accounts were in a satisfactory condition, but it was obvious that, at the present price of gas, they could not find themselves in so satisfactory a position at the end of the current year. For a considerable portion of the past fifteen months, they had been paying for coal 26s. a ton; but it had now risen to 37s. For the first three months of the period, they had sold gas at 4s. 3d. per 1000 c.ft., and for the remaining twelve months at 4s. 6d.—the maximum price allowed under their Special Act. He advised that they should take immediate steps to procure a Provisional Order giving them power to increase the price. The Clerk said they had also the increase of wages to consider. The Auditor's report and the question of obtaining a Provisional Order were referred to the Gas Committee.

Coal Carbonizing Parent Syndicate.—A Company has been registered under this title, with a nominal capital of £2000 in £1 shares, to carry on business as "merchants, manufacturers, and brokers, exporters and importers, engineers, property owners, builders, contractors in all kinds of chemicals, merchandise, and produce."

Meter Charges at Heckmondwike.—The Heckmondwike and Liversedge Tradesmen's Association have protested against the Gas Company giving notice of their intention to make a general advance in meter-rents. They contend that the proposal is illegal. At a meeting of the Association, a letter was read from Mr. F. D. Richmond (the Secretary of the Company) pointing out that the cost of meters and fittings has advanced 77 p.ct., and that the increased rents would give a return of only 7·3 p.ct. on the outlay, whereas the usual basis has been 10 p.ct. Mr. Richmond further said little gas—and in some cases none at all—was used by a large percentage of consumers in summer; and, at the same time, these consumers require as much looking after as the big ones. The Company give free attention to complaints, even when not due to defects for which the Company could be held responsible; and he added that the price of gas in the Company's area has been increased less than the general average. The Secretary of the Association (Mr. Cliffe) described the reply as evasive. The meeting was pretty well unanimous in expressing the feeling that the Company, by increasing their revenue through extra meter charges, did not endanger the statutory dividend, as they might do by advancing the price of gas.

Natural Gas in Italy.—An announcement appears in "The Times" of a discovery of a large supply of natural gas in Italy, which is particularly welcome with the present shortage of coal. The spot where it has been found is about 2 miles from Pisa; and the town is now lit by means of this gas.

Inferior Coal at Barrow—At the Barrow Town Council meeting last week, Alderman Neal, J.P. (the Chairman of the Gas Committee), said he was not surprised to hear complaints about the gas supply. As a matter of fact, they had been getting coal which was only yielding two-thirds of the gas expected; and they had had to resort again to carburetted water gas. Coal which used to come to Barrow from Yorkshire was now going to Birmingham; and the new arrangements for coal control was another blunder on the part of the Government.

Winchester Water and Gas Company.—In consequence of the further large increases in the cost of coal and labour, the Directors felt it necessary to raise the price of gas as from Midsummer last by 3d. per 1000 c.ft. In announcing this fact in the report which was adopted at the recent half-yearly meeting, the Board added that, owing to the difficulties of obtaining material and labour, it has not been possible to execute the usual and proper repairs to the works; but provision has been made for this. The balance of net revenue account available was £9122; and a dividend, less income-tax, at the rate of 4¼ p.ct. per annum was declared for the half year on the consolidated ordinary stock. The Chairman (Mr. J. C. Warner) said that he had to offer on behalf of the Directors, and he was sure on behalf of the shareholders also, an expression of their warmest thanks to Mr. H. C. Head (the Engineer, General Manager, and Secretary) for the great services he had rendered the Company during the past six months. It had been a most arduous time.

Conservation of Food Stuffs in the United States.—Following the energetic lead of the National Commercial Gas Association, the principal gas undertakings are moving in this matter. The Consolidated Gas Company of New York have opened a Government exhibit, occupying the entire second floor of their spacious new offices, under the general charge of Prof. F. Lamson Scribner (Chief of the Agricultural Department's Bureau of Exhibits) and of Mr. O. H. Benson (Chief Department Expert on Food Dehydrating, Canning, and Preserving). On several days previous to the opening, Mr. Benson was lecturing and demonstrating before large classes of women recruited by the Gas Company, intended to qualify as demonstrators and to teach others, by holding free classes daily in all the district offices belonging to the Company. Exhibits from the Department of Agriculture, together with many of the most instructive displays from the San Francisco Exposition, have been arranged; and the opening day was a great success. Demonstrations will be given daily. The exhibition will be open for four or five weeks; and Prof. Scribner regards it as the biggest thing that the department has yet undertaken.

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Worthing Gas-Works Results.

The half-yearly meeting of the Worthing Gas Light and Coke Company was presided over by the Chairman (Mr. H. H. Gardner), who said the output had increased and was increasing; and, on the whole, he thought the proprietors would be satisfied with the results. The sale of gas in the six months ended June 30 had realized £1434 more, which was partly accounted for by the increase of 2d. per 1000 c.ft. in the price in the second quarter, but was mainly caused by an increase of 6,208,500 c.ft. in the quantity sold. Coal had cost 1s. per ton more; and war bonuses to employees figured at £337. The balance carried to profit and loss account was £3852, as compared with £3581 a year ago. The report having been adopted, a dividend at the statutory rate of 5 p.ct. per annum was declared. The working statement of Mr. Sidney O. Stephenson (Engineer and General Manager) showed that the make of gas per ton of coal carbonized worked out at 11,441 c.ft., of which 10,615 c.ft. had been accounted for. These figures would have been even better had the whole of the coal been of the proper quality. The net cost per 1000 c.ft. of gas into the holder was 1s. 8d., as compared with 1s. 8½d. in 1916. During the past half year, a plant has been erected for the extraction of benzol from the gas, to further assist the Government.

Lisburn Gas Price.—The Lisburn Urban Council have decided to raise the price of gas, as from Oct. 1, from 4s. to 5s. per 1000 c.ft.

City of Chichester Gas Company.—Conditions at Chichester would appear to be on the mend; for the Directors were able to report at the half-yearly meeting an increase of slightly over 10 p.ct. in the sales of gas. This is the first increase experienced by the Company since the outbreak of war. The higher prices that have had to be paid for coal and other materials have again materially affected the accounts; but the larger returns from gas and residuals counterbalanced the extra charges. The balance standing to the credit of the profit and loss account was £1678; and dividends were declared for the half year at the rate of 5 p.ct. per annum upon the "A" capital stock, and 3½ p.ct. per annum upon the "B" and "C" capital stocks, both less income-tax.

Smart Progress at Detroit.—The Detroit City Gas Company do not allow war contingencies to interfere with rapid extensions, or take a gloomy view as to the future supply of petroleum. They have recently completed a 7 million c.ft. set of carburetted water-gas plant, and placed the order for another—and this at a time when others are complaining about the continually advancing price of petroleum, and reverting to the use of coal. They have acquired 10 acres of land, and now have ten stations, all interlocked to admit of changing the sources of supply as circumstances may require. The storage plant includes a 3 million c.ft. gasholder; and this large unit is in course of duplication. A large pumping-station is in progress; some 75 miles of mains will be laid in the course of the current year; and a similar length is in contemplation for 1918. The service-piping put down during 1917 will aggregate over 1,000,000 ft. in length.

Capital and Revenue Expenditure at Wigan.—A point was raised in the Wigan County Borough Council with regard to the provision of plant out of revenue. Mr. Alstead said he wondered how much plant had been bought by the Gas Committee out of revenue during recent years. He had been much impressed by the laxity in vogue in all departments of the Corporation, in regard to keeping records of such amounts; and it would be interesting if the Chairman of the Gas Committee would try and find out how much money had been spent on plant out of revenue, and where the plant was. In reply, Mr. Farr said the general policy of the Gas Committee had been to spend out of revenue in special circumstances; and this, he thought, was the correct policy. They had an undertaking which, in their opinion, was very much over-capitalized; and they were trying to keep capital outlay within bounds as far as possible. This seemed to him to be the more sensible procedure.

Record Consumption at Tonbridge.—The past half year has been a memorable one for the Tonbridge Gas Company, on account of the big increase in the consumption of gas. This increase amounted to 9½ million c.ft., or nearly 15 p.ct.; and during certain periods the gain was 33 p.ct. as compared with the corresponding period of last year. This, said the Chairman (Mr. W. Judd), at the meeting, had caused much anxiety to the Manager (Mr. J. Donaldson) and the staff. A pleasing feature, he added, was that the day output was double that of the night. The report showed that the increase in revenue was £1358, which followed upon an increase of £2431 last year; and the Directors see no reason at present for raising the price of gas. The Chairman said that their Provisional Order, for raising new capital, &c., which has just been passed, gives the Company practically all they asked for. They had to congratulate themselves on having only increased the price of gas 4d. per 1000 c.ft. during the three years of the war. They had been able to earn their dividends, notwithstanding the many difficulties which had had to be encountered.

Colchester Gas Company's Change.—Last year the Colchester Gas Company were changed from a maximum dividend into a sliding-scale undertaking; and the dividends have now been increased from 10 and 7 p.ct. to £10 15s. and £7 10s. 6d. p.ct.—the price of gas being still 3s. per 1000 c.ft., the same as before the war. Of course, in this case the standard price was fixed in 1916 with due regard to the position brought about by the war, and the prospects before the industry. The accounts presented at the recent half-yearly meeting showed a balance of profit of £2917; and the Vice-Chairman (Mr. W. G. Benham), who presided, said the period had been a remarkable one in the history of the Company. There had been an increase of no less than 15 p.ct. in the output of gas. The consumers now total 7917, or nearly equal to the number of inhabited houses in Colchester. He desired, on behalf of the Board, to acknowledge their indebtedness, and also that of the shareholders and the consumers, to the Engineer and Manager (Mr. W. W. Townsend), the Secretary (Mr. W. English), and the staff generally. Mr. Townsend had met all difficulties with admirable judgment, skill, and courage.

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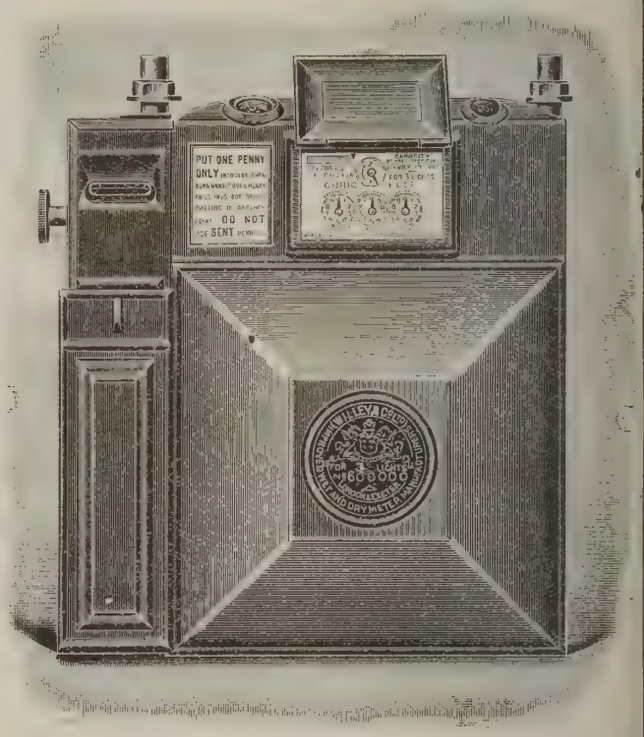

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No Manager to be Obtained.—At a meeting of the Gas Committee of the Kirkcudbright Town Council, it was agreed to allow Mr. H. F. M'Nair, the Gas Manager, to visit Dalbeattie once a week and superintend the works there. It was stated that the Dalbeattie Gas Manager had been called up for service; that the manager appointed in his place had given notice; and that no other manager could be obtained for Dalbeattie.

Cork Gas Consumers' Company.—Considering high freights and other adverse conditions, Mr. W. B. Harrington (the Chairman) said at the half-yearly meeting of the Company that he thought it satisfactory to be able to recommend a dividend at the rate of 6 p.ct. per annum for the half year. They had not put anything aside for depreciation, and had to take a little from the reserve fund to pay the interest named. The balance of profit and loss was £3262; and the dividend required £3290.

Price of Gas at Ulverston.—The Ulverston Urban District Council have empowered the Gas Committee, after the price of coal has been definitely settled, to increase the cost of gas to such a figure as will make the gas-works remunerative. If the Coal Control Board's new scheme is carried out, Ulverston will not be able to continue its coal supply from Yorkshire, but will have to take it from Northumberland and Durham, which will mean an increased cost of 5s. to 6s. per ton at present rates and freightage.

Wages at Leeds.—The Chief Industrial Commissioners' Department having awarded a further 2s. a week as war bonus to the members of the General Workers' Union in the Leeds Corporation Gas and Electricity Departments, the City Council have approved a recommendation of the General Purposes Committee that the increased bonus be granted to all Corporation officials and workpeople whose wages or salaries do not exceed £250 per annum. The 2s. is in addition to 7s. already being paid. The new bonus is to be retrospective to Aug. 1.

A Record at Morpeth.—Addressing the shareholders at the annual meeting of the Morpeth Gas Light Company (1902), Ltd., the Chairman, Mr. R. Crawford, said that last year was a record for them; the profit amounting to £2186. The quantity of gas sold was 24,206,000 c.ft., as compared with 26,377,000 c.ft. in the preceding twelve months. It had been an anxious period; but the Directors and officials had been amply repaid by the success which had attended their efforts. He referred in eulogistic terms to the work of the officers and men. Mr. Richard Lockey (the Secretary and Manager), he said, had rendered excellent service to the Company during the year. A dividend on the ordinary shares of 5 p.ct. per annum, free of tax, was declared.

A Larger Consumption at Southgate.—As compared with the results for the corresponding half of 1916, the sale of gas by the Southgate and District Gas Company in the six months ended June 30 last showed an increase of 10,785,500 c.ft., or 9·9 p.ct., and the revenue from residual products an increase of £969. The expenditure on revenue account, however, exceeded that of a year ago by £2644; coal and oil representing £2075 of this amount. After providing for interest charges, &c., there remained a balance of profit of £5237; and out of this were declared, at the meeting last Thursday, dividends for the half year at the rates per annum of 5 p.ct. on the preference capital, 10 p.ct. on the original capital, and 7 p.ct. on the additional capital—leaving £912 to be carried forward.

Oxford Gas Light and Coke Company.—It was stated in the report adopted at the annual general meeting of the Company that the business for the year ended June 30 had been satisfactory, especially considering the lighting restrictions, and the difficulties of transport and shortage of labour. The Directors had, however, to record a slight reduction in the quantity of gas sold, together with an increased cost of coal carbonized, as compared with the previous year; but, assisted by better returns from residuals, any further increase in the price of gas has so far been avoided. The statutory dividends were declared. The receipts on revenue account amounted to £83,238, against £75,217; the expenditure being £72,575, as compared with £64,929. No expenditure on capital account was incurred during the year; the total outlay remaining at £234,618.

A small fire occurred at the Admiralty, where a defective electric circuit caused an outbreak in a corridor.

Women employed at the gas-works have asked the Glasgow Corporation for an advance of 5s. a week; and the matter has been referred to a Special Sub-Committee to deal with.

The Portsmouth Corporation have received an application from the Portsea Island Gaslight Company to rent a portion of the Flathouse Wharf for the period of the war and six months afterwards. The Company propose to utilize the site for the deposit of coke, which they estimate from time to time will be about 3000 tons. It has been agreed to let the Company have the site.

During July, the Gas Light and Coke Company suffered two disasters to their fleet of steamers. First the "Flamma" was mined, and twelve days later the "Glow" was torpedoed and sunk by a German submarine. Unhappily, in the latter case the Chief Gunner was killed, and the Steward injured. The Captain, officers, and the remainder of the crew were brought to shore safely. Two more steamers will be available at an early date to fill the gaps thus caused.

The necessary adjustment of the partnership affairs of the Chemical Engineering Company and Wilton's Patent Furnace Company has now been made. Messrs. Norman Wilton and Thomas Owston Wilton, who owned one-half of the business, have purchased the half share of Major George Wilton, who has retired. The business has been converted into a private limited company, which will be known as the Chemical Engineering and Wilton's Patent Furnace Company, and will carry on the business on precisely the same lines as heretofore. Mr. Norman Wilton will become Managing-Director jointly with Mr. T. Owston Wilton.

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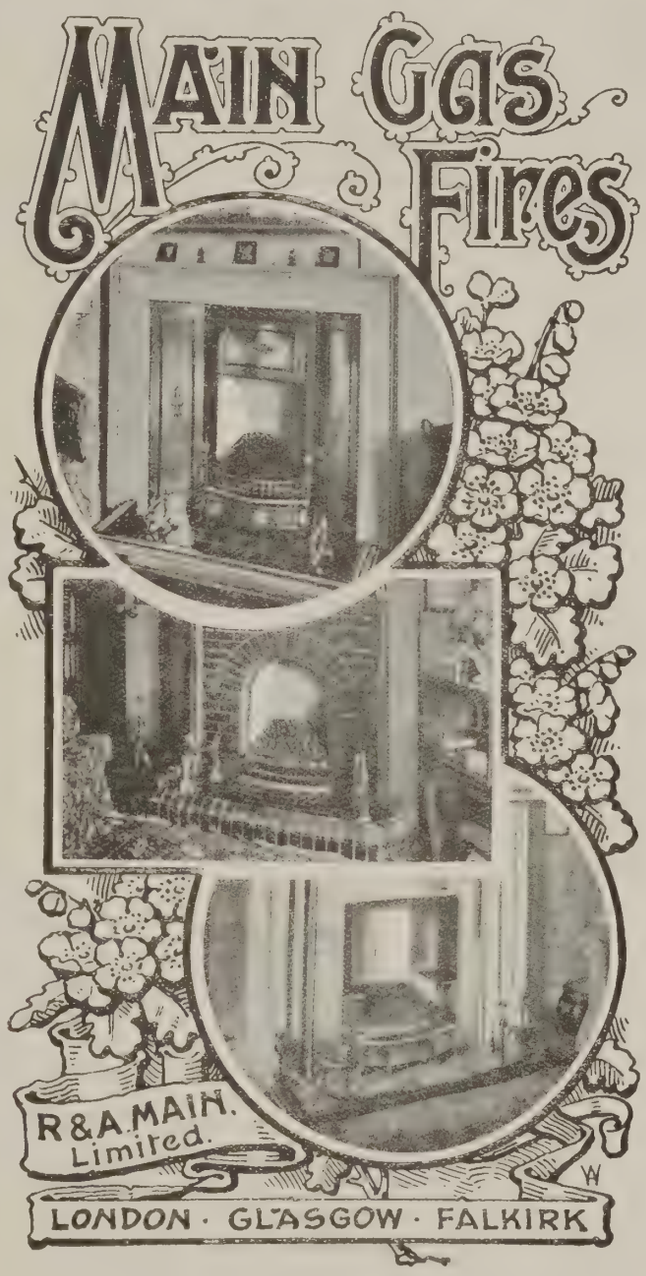

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Carnarvon Gas-Works Results.—Reporting upon the accounts of the Carnarvon Corporation for the year ended March 25 last, the Auditor says that, as might have been expected, coal for gas production cost the Corporation £400 more than in the previous year; but the receipts from the sale of gas also show an increase of £350. The revenue account mentions a net profit of £140, compared with £107 for the preceding year.

Lighting and Power Restrictions in New Zealand.—Advices from Wellington (N.Z.) state that regulations imposing certain restrictions upon the use of lighting and motive power derived from gas or electricity produced from coal have been gazetted. According to the Minister in Charge of Munitions and Supplies, the regulations were framed as the result of recommendations submitted by the National Efficiency Board. The primary object of the Government was, if circumstances justified it, to prohibit the use of electric light or gas light produced from coal power for any other than an essential purpose. While the Government generally entertain no desire to restrict the activities or enterprise of business people, it is considered that the position in regard to coal stocks justifies their request to local authorities to consider the curtailment of power that is being utilized for such purposes as advertising, verandah or external lighting, excessive window or internal illumination, and unnecessary street lighting.

A Satisfactory Year at Peterhead.—To the Peterhead Town Council, the Convener submitted a report on the working of the Gas Department for the year to May 15 last, which had proved one of the most satisfactory years in the experience of the undertaking. He also submitted an estimate of the revenue and expenditure for the current year, and moved that the Committee recommend that the price of gas remain as at present—namely, 4s. 8d. per 1000 c.ft. for consumers by ordinary meter, and 4s. 10d. for consumers by prepayment meter. This was agreed to. Subsequently the Town Council passed a vote of thanks to the Gas Committee for the successful results achieved.

Nottingham Gasworkers' Wages.—Anticipations of a considerable period of more settled conditions, following upon the award made some time ago by Sir G. Askwith, conceding most of the employees in the service of the Nottingham Corporation Gas Committee substantial advances of wages, are proving doomed to failure. Already some further heavy demands have been formulated; the men joining, with others, in an application which was made at the last meeting of the Council for an all-round increase which, if granted, would, it was estimated, entail an additional annual expenditure in the Gas Department alone of £20,000. The wages bill in connection with the undertaking has already risen at an alarming rate; and any additions may well be viewed with serious apprehension.

STOCK MARKET REPORT.

Another change—and an unwelcome one—came over the Stock Exchange last week, when markets in general were found to be quite unequal to maintaining the fairly firm attitude which had characterized the close of the week before. The Russian retreat from Riga and the state of affairs in general in that suffering land had much to do with influencing a tone of weakness; and this was intensified by a move to realize profits in numerous lines after the free advances of several past weeks—a move which met with but a chilly response from markets not particularly desirous of buying. Thus the week was persistently dull throughout—falling prices ruled everywhere, and at the close there was no sign of a rally.

In the gilt-edged market, Home Governments held on as well as anything, and War Loan was fairly steady; but Consols were easier. Home Rails had quite a dull time without a gleam of sunshine in any direction. Americans showed no improvement, and Argentines were much depressed by labour troubles and the threat of a general strike.

The Foreign Market showed a few bright spots in Scandinavian, Chinese, and Japanese; but Russians of all sorts were, of course, much depressed and difficult to deal in. South Africans were irregular and for the most part weaker.

In the Miscellaneous group, the general tone was weaker; realizations being the order of the day. This did not affect Rubber much; but Oil, Explosives, and Textiles underwent a reaction.

Business in the Gas Market was quieter. The bulk of the bargains recorded was in Gas Light ordinary, which was in good demand and made a further advance in quotation. Among the rest, there were dealings in some issues which do not often show. Primitivas were very quiet, and had a set back; but all other changes in quotation were in the upward direction—viz., Bombay, British debenture, Imperial Continental, Sheffields, and South Metropolitan.

In the Money Market rates were steady.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 79½, 80, Commercial 4 p.ct. 71¾, Gas Light ordinary 71, 71⅛, 71¼, 71⅜, 71½, ditto debenture 56½, Imperial Continental 83, 83½, 84, South Metropolitan 72¼, ditto 5 p.ct. preference 94⅛, 94¼, 94½, 94¾. On Tuesday, Commercial 4 p.ct. 71½, European £11 os. 9d., Gas Light ordinary 71¼, 71½, 71¾, 72, 72½, ditto preference 71, 71½, Imperial Continental 83, 84, Liverpool 81½, Primitiva 46s. 3d., ditto preference 61s. 3d., 63s. 9d., South African 8½, South Metropolitan 72¼, 72¾, 72⅞. On Wednesday, Bournemouth "B" 10 13/16, 10⅞, Gas Light ordinary 71½, 72, 72½, 73, Malta and Mediterranean 77s. 6d., 78s., South Metropolitan 72. On Thursday, Brentford "A" 80, British 33, ditto debenture 69¼, 70, Commercial 3½ p.ct. 65, 65½, ditto debenture 51⅛, Gas Light ordinary 71¾, 72, 72¾, Imperial Continental 84, 84½, 85, Monte Video 8. On Friday, Alliance and Dublin 53½, Commercial 4 p.ct. 71½, 71¾, Gas Light ordinary 72⅝, ditto maximum 56¾, Hastings 3½ p.ct. 48¾, Metropolitan of Melbourne 95¾, Primitiva preference 63s. 9d., South Metropolitan 73½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex. Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	53½
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	5—5½	..
50,000	10	Feb. 26	16	14%	Bourne- mouth Gas and Water (10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	29—30	23—25*	..
						15—15½	10½—11*	10 1/16—10⅝
383,110	10	,,	7	7%		13½—14	9—9¼*	..
115,000	10	,,	6	6/-		..	68—71	..
159,740	—	—	—	4%				
992,045	Stk.	Feb. 26	14	5 5/16%	Brentford A Consolid.	261—266	79—83	79½—80
734,920	,,	,,	11	4 7/16%	Do. B New	204—209	74—79	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	69½—70
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2⅜—3¼	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6¾—7¾	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79*	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72*	71½—71¾
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66*	65—65½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	51½
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175*	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	11—12	11/0/9
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke (4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds	98—102	71—73	71—73
2,600,000	,,	,,	3½	3½%		76—79	56—58	56⅜
4,062,235	,,	,,	4	4%		96—99	70—72	71—71½
4,674 850	,,	June 11	3	3%		72½—74½	55—57	56½
130,000	,,	,,	10	10%		..	..	..
2 8,740	,,	Mar. 12	5	4⅛%	Hastings & St. L. 3½ p.c.	87—89	50—55	48⅜
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7½—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c.	..	120—130	..
131,000	Stk.	Mar. 12	7⅛	7⅛%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5⅞%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	82—87	83—85
1,235,000	,,	Feb. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6⅛%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. (A / B)	211—213	81—82*	81½
						146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅝	3¾—4	77/6—78/-
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	95¾
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	12½%	Portsea, Island B	128—131	83—88*	..
100,000	50	,,	12	11%	Do. C	118—121	73—78*	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2—2¼	46/3
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4¾—5	3—3¼	61/3—63/9
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. / 5 p.c. Deb.	10½—11	7⅜—8¼	..
125,000	50	July 1	5	5%		47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224		
209,984	,,	,,	10	10%	Do. B	222—224	180—184*	..
523,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African.	10½—11½	8½—9½	8½
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74*	..
—	—	—	—	—	Do. Pref.	—	—	94⅛—94¾
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	..
224,820	,,	Feb. 26	8½	7⅛%	South Shields Con. Stk.	157—159	137—139*	..
952,795	,,	,,	6	4⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4⅝%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5⅛%	Tottenham District (A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	135—138	92—97*	..
782,275	,,	,,	6	4%		115—117	66—71*	..
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅝	72/6	Wandsworth A 5 p.c.	151—156	112—117*	..
255,636	,,	,,	6⅞	57/6	Do. B 3½ p.c.	129—134	97—99*	..
108,075	,,	,,	5/17/3	50/9	Do. C 3⅛ p.c.	110—115	84—89*	..
352,000	,,	,,	6⅛	51/3	Wimbledon 5 p.c.	117—122	85—90*	..
98,000	,,	,,	6⅝	57/6	Epsom 5 p.c.	121—126	93—98*	..
88,416	,,	June 26	8	8%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

GAS JOURNAL

LIGHT ⁂ HEAT ⁂ POWER ⁂ BYE-PRODUCTS

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EDITORIAL NOTES.

The Gas Undertakings Deserving Relief.

On high authority we were told the other week that "when "a member of the National Gas Council went to the Board "of Trade about this matter" [that is to say, relief for gas undertakings where war conditions have brought about serious oppression], "he was told that, inasmuch as the "sliding-scale was a bargain, they would have to ex- "amine into every case by itself, because each presented "its own individual conditions." Another high authority had previously said: "I do not see how we could expect "relief from Parliament while the war rages." The former authority also stated that he was certainly puzzled to know in what way the Board of Trade, in its present congested state, could take up the work of reviewing the "question "in every gas company in the kingdom. It was hopeless, "even if Parliament would sanction it." There appears to be want of imagination in these remarks. If such a want were present in the general conduct of the war on the part of the Allies, then the position of those fighting for right, honour, and the suppression of Prussian tyranny might as well be at once relinquished. The financial conditions of the gas industry have been dragged down from a high level to a low one; and nothing whatever has yet been done to stop the course of the flow. It is plain from the quoted remarks that what is wanted is a *modus operandi* for securing a *modus vivendi*. Last week we pointed out a means by which the Board of Trade could be relieved of the work; and an old precedent was quoted in support of the proposition. If *ad hoc* Referees or Commissioners were appointed, with the sanction of Parliament, to take the matter in hand, it could be easily accomplished.

There is now the second question to be considered, and that is as to whether the work that would confront the appointed body would be of such an extensive character that it would be impossible for the members to deal with it judicially. The authority whose remarks were first quoted said: "The "sliding-scale now existed almost universally." That is untrue if applied to companies, and not to capital. The sliding-scale now covers a considerable proportion of the privately-owned gas capital of the country through the Metropolitan and Suburban companies being included; but, taking the last-issued complete returns of the Board of Trade to December, 1913, there were 265 statutory gas companies working under the sliding-scale, and 253 (excluding the South Staffordshire Mond Gas Company) still under maximum prices. There is nearly an equal division, which is a different tale. There have been a few transfers from the maximum to the sliding-scale condition during the war years; but they would not make a considerable difference to the tale of the 1913 returns. The authority whom we have quoted went on to say that "the maximum or fixed "price companies were in a worse condition, for when they "exceeded their fixed price, they must go on selling at a "loss." These various statements constitute matter for investigation, and especially the last one, as much depends on the degree of the maximum price itself.

In regard to the sliding-scale companies, it is only those concerns with low standard prices that are first in need of relief; and the companies with the higher standard prices, unless extraordinary circumstances affect them, might not have, while the war lasts, to trouble any tribunal set up to grant relief until the circumstances of the sliding-scale can be investigated and legislated for under the new level of conditions which, succeeding the war, will be found to have entirely obliterated those that pre-existed, and particularly those that prevailed when the terms of the sliding-scale were originally arranged. Analyzing the standard prices of the 265 sliding-scale companies in the returns of 1913, one marvels at the great divergence in them, which divergence seems to have more relation to the period of time at which they were fixed than to those factors that are generally declared to come under the review of Select Committees in determining a fair standard price. Generally speaking, the higher the standard prices, the more remote their fixing from the times of harder working conditions; and it has only been progress in gas production and utilization and enlarged business that have enabled many low standard priced companies, with the increased costs for material, labour, and money, to arrive at the position they reached prior to the war. Some divergence is also found at the same period of time; but, from an intimate acquaintance with Parliamentary Committee room work, we are safe in saying that the factor that has had greatest effect in causing the divergence has been the cleverness of Counsel and of the expert consultants whom they have had in the witness chair to assist them. Otherwise, there is little reason to be detected in the differences of conditions as to why, in certain cases, "A" should have had in one session 4s. fixed as the standard price, while "B" only obtained (say) 2s. 6d. Then, very generally speaking, in later years, notwithstanding that the prices of material, labour, and money have been at a higher level, there has been a tendency for the standard price to slide downwards (compared with prior fixations) where there has been conversion from maximum to sliding-scale conditions.

However, it is not difficult to show that the members of a specially appointed body would not have a terribly imposing task in considering the question of temporary relief under the extraordinary circumstances of the time. They would naturally start their work from the lowest standard prices; and, beginning with York (which holds the record for lowness with 2s. 3d.), there are only 42 undertakings with standard prices up to 3s. 4d.; then 25 have standard prices of 3s. 6d.; and 33 between 3s. 7d. and 3s. 11d. In these figures we are not noticing special standards applying to outside districts; and in the few cases where there is a neutral zone the figure has been taken at which dividends would commence to decrease. Now up to 3s. 11d., 100 companies are concerned out of the 265 sliding-scale ones; and the capital represented by these 100 companies is an immense part of the total capital of private gas enterprise. There are only thirteen companies with maximum prices between 3s. and 3s. 9d.; and only three of them below 3s. 6d. There are thus 240 maximum price companies rejoicing in maxima from 4s. upwards. These figures show that, approaching the task from the lower standard prices and the maximum ones, a special tribunal would not by any means have an unwieldy proposition before it.

While we have the further results of our analysis at hand, we may, for the sake of the interest attaching to them, present them to our readers. In regard to the sliding-scale standard prices, no less than 154 companies have standards between 4s. and 5s. inclusive. The 4s. standard price leads with 41 companies; 4s. 1d. to 4s. 5d. follow with 35 companies; 4s. 6d. succeeds with 31 companies; 4s. 7d. to 4s. 11d. govern 24 companies; and 5s., 23 companies. The balance of the eleven companies have standard prices ranging from 5s. 2d. to 6s. 10d. Now between 4s. and 4s. 11d., we have 79 maximum price companies—making, with 13 below 4s., 92, and leaving no less than 161 companies with maximum prices from 5s. upwards. Therefore, on the whole number, the maximum price companies are considerably better off in these times than the sliding-scale companies. Putting the

figures for the maximum price companies in greater detail, there are 19 companies with a maximum price of 4s.; 9 between 4s. 1d. and 4s. 5d.; 34 with 4s. 6d.; 17 between 4s. 7d. and 4s. 11d.; 65 with 5s.; 14 between 5s. 1d. and 5s. 5d; 25 with 5s. 6d.; 16 between 5s. 7d. and 5s. 11d.; 20 with 6s.; and 21 between 6s. 1d. and 8s. 4d.

The figures demonstrate that, with the exception of a few maximum-price companies, there are a larger number of sliding-scale companies that should have early relief, but yet not such a number that the task would be too great for a special tribunal to handle. There is no reason why the share and stock holders of the high standard and maximum price companies should be in a preferential position in these exceptional times. It is their good legislative fortune that they are so, and not owing to individual merit. Another thing that our analysis shows is that the standard prices have largely been fixed at levels lower than the maximum prices; so that shrinkage of standard dividends commences early, while with maximum price companies there is no shrinkage of maximum dividends so long as the maximum price will provide, with reserves, sufficient money to pay them. It may be suggested that the lower standard dividends have in some cases been fixed owing to the better profit-earning power of the companies. This may apply in normal times to some of the companies—not to all. Some of the good profit-earning companies of pre-war times are to-day paying five to six times more for the sea carriage of their coal than in peace times. Reiteration may be given, in conclusion, to a point made on other occasions, that, unless a profit can be earned which will pay a fair interest on the capital employed, then the consumers are not paying the actual costs of production. It was seen last week [p. 457] that the price of gas in Berlin is to be raised from the equivalent of 4s. 6d. to 5s. 8d. per 1000 c.ft.; and, as it is accounted there in these days a merit to be a small consumer, the charge to prepayment and other small consumers, using less than 365 c.m. per annum, is to be 5s. 1d. per 1000 c.ft.

Gas Council or Advisory Committee for Scotland.

Now that we have before us the full report of the discussion at the North British Association meeting on the proposed Scottish Gas Council, it cannot be said that we are altogether pleased with its general tone. In it is discerned a division of opinion, an ill-concealed antagonism to the National Gas Council, and, despite protests to the contrary of those who think rationally and see ahead, there is in some quarters an evident disposition to detach Scotland from the National Council, and proceed independently of it. Those who are wise, and have regard for the gas interests of Scotland, will see to it that the extremists do not work their way, but that moderation is allowed to prevail. There is manifest dissatisfaction with the representation of Scotland upon and by bodies with headquarters in London; and it would be well to inquire into the cause of this, as a preliminary to anything else being done. Mr. Alex. Wilson, we think, put his finger upon the trouble, when he said he thought its root was to be found in the modicum of representation of Scotland on the Council of the Institution of Gas Engineers, with the consequent attenuated representation on the National Gas Council. Now if this be so, whose fault is it, and what should be done? The fault is that of Scotland, in contributing such a small membership to the Institution. And what should first be done is to make an attack on the root of the trouble, so that Scotland could command a better representation at the very hub of the work of the gas industry, for that is where Scotland must be, and not away or separate from it, if it is to achieve for itself the best and most enduring results.

Though there is a division of opinion as to the necessity for the formation of a Scottish Gas Council, the project has undoubtedly a large following; and it is patent that the following is strong enough to effect its purpose, whether or not the result will be to the ultimate advantage of the gas undertakings of Scotland. The President of the North British Association (Mr. John Lang), and Mr. J. W. Napier, who has been prime mover in the matter, are both of opinion that Scotland requires a body of its own; for, in their view, there is plenty of work that is individual to itself. But these and some of the other speakers disclaimed all intention of opposition to the National Gas Council—asserting that the Scottish Council should work collaterally or in conjunction with the national body. The disavowal on the part of certain speakers of any intention to bring about even the semblance of opposition to, or separation from, the national body must be accepted, because we believe that these Scottish friends are acting in perfect good faith, with the conviction that what they are contemplating is the best possible for their undertakings. But their reticence in displaying any disposition to depart from even the appellation chosen for their Council is not the best evidence that could be presented by them of a desire to work conjunctively with, rather than independently of, the national organization. What would be the tendency of having one body with the title of the "National Gas Council" and another called the "Scottish "Gas Council"? Separation, and independent action! What would be the idea that would be present in the minds of outsiders who were brought into contact with these two titles, without the position being fully explained to them? That there were two bodies—the one aspiring to national representation, but such representation impaired by the existence of the Scottish organization, with its relatively limited territorial power and influence. Without a modification of their attitude, we can see the promoters of this scheme for Scotland producing disintegration, and a weakening of the power of the larger national body; and the whole gas industry will be the sufferers—the Scottish gas undertakings included. We say it seriously, and with all respect for our Scottish friends, that even the semblance of division or an aspiration to equality on the part of Scotland, will do infinite harm to the recognition that the National Gas Council has already attained, and will do no good to Scotland. We regret exceedingly to see the remarks made by Mr. William Wilson in speaking of the "opposition" of the National Gas Council to the scheme, which he interpreted as showing that the central body "were afraid that Scotland "would detract from the standing of the Council if she dared "to elect a similar body of her own;" and further, "if "the National Gas Council cared to extend a hand and "help them in a brotherly way, then they in Scotland would "accept their assistance, but they did not altogether relish "the suggestion of being mothered." These remarks do not appeal to us as being diplomatic; they are certainly not founded on unity; and they rather suggest jealousy. The National Gas Council is constituted of men who give their work voluntarily; and whatever fear they have of any appearance of separation is due not to any lowering of the standing of the Council, but to the detrimental effect upon the whole industry. In this detrimental effect, a prudent consideration should satisfy, Scotland will assuredly participate.

We quite admit that gas matters do arise for deliberation and settlement that are peculiar to Scotland; but these questions are in minor part to those affecting the larger general policy which can best be handled by one body representative of the whole industry. We have considered carefully what Mr. Napier had to urge upon this particular aspect of the matter—that is to say, questions individual to Scotland—which alone can give any justification for the appointment of a body to be known as the Scottish Gas Council. And nothing can be seen that justifies anything more than a special body whose functions should be advisory and consultative, and whose action should be through the national organization. The suggestion as it is presented indicates that Scotland wishes "to paddle its own canoe," while not forfeiting anything that can be gained through the paddling of the national canoe by the National Council. Anyway, if the proposed body is persisted in, it must result in a modified adhesion to the National Council upon the part of Scotland; while a Scottish Advisory or Consultative Committee could be of valuable help to the latter in view of the geographical position of Scotland, and the legislative differences that, it is admitted, do exist. A Committee has been appointed to consider the matter, to formulate the details, and to submit their plan at another meeting of the Association. They are entering upon their work with the claim for a "Scottish Gas Council" set firmly before them. Fervently, we appeal to them to consider with care whether or not such a body, with such a name, is desirable, and whether there is any probability if formed that it can fulfil any really useful purpose apart from being advisory and consultative. If it is believed that it cannot, then let the recommendation that goes to the Association be a modification of current aspiration. Government Departments were at one time always complaining of the divided representation of the gas industry. They did not know to which body to go; they did not know which was the correct body to hear in respect of any particular matter.

Whatever Scotland does, the Government Departments will (now that they have become accustomed to dealing with the National Gas Council) still go to it, and still expect to be addressed by it. They will not want any return, even partially, to the old unsatisfactory conditions. If there is any choice between hearing the National Gas Council and the Scottish Gas Council, they will turn to the body they know, and not to the newer body, brought into existence—for what purpose or reason? It is a matter over which there should be hesitation before making a move, lest the drastic remedy for what is considered to be the insufficient representation of Scotland lets Scotland down still further, and coincidently damages, in quarters where it is most important, the representation of the whole industry.

Indirect Profiteering in Coal.

A short time ago correspondents and ourselves were freely calling attention to the scandalous percentage of inert material that was being distributed by collieries as coal. This appears to have become a general practice—the excuse being the delay that picking causes to the despatch of coal-wagons from the collieries. Whether the gain in time is equivalent to the (say) 10 to 12 p.ct. reduction occasioned in the coal-carrying capacity of the wagons through the increased percentage of inert material, we deliberately doubt; but certain it is that the more expeditious despatch of the coal-wagons containing the large excess of valueless material is no compensation for the accumulation of uneconomy that the distribution of such material spreads throughout the land. In the gas industry alone, a 10 p.ct. increase of inert material means on the consumption of (say) 18 million tons of coal per annum, 1,800,000 tons excess of useless material that has to be carried and delivered; and it further means that coal to the extent that this quantity causes a deficiency in the genuine manufacturing material has to be purchased to counterpoise it, and in order to meet the demands for gas and other products. This extra coal has to be transported by sea or by rail. In other words, while the Coal Controller has been exercising his wits in devising schemes for the curtailment of railway traffic, the collieries have been exercising theirs in the contrary direction, by indirectly causing the requirement of (say) from 10 to 12 p.ct. greater home sale of coal through the dirty condition of that sold. For the gas industry, this large bulk of inert material means not only loss through additional purchase, conveyance, and handling, but loss through the reduced carbonizing capacity of the retorts, through, too, the lowering of the yield of gas and other secondary products per ton, through also the increase of the fuel account, the reduction of furnace efficiency, and the labour in keeping furnaces clean. The industry has a very strong case against a condition of things that does not improve, through the disinclination to say much with the needs and difficulties of next winter rising so threateningly from its immediate landscape.

But the uneconomy of this condition is cumulative; and it is therefore essentially a matter for the Government and the Coal Controller to end as promptly as possible. The national loss occasioned through so simple a matter is a perfect disgrace. Hence the reason that Mr. John West, in our "Correspondence" columns, urges that gas undertakings should make a united stand against the "imposition" that this additional inert material represents. He speaks of one coal which he has had under investigation, which before the war contained 5 p.ct. of ash, and is now delivered containing 13·8 p.ct. of rubbish. By 2 or 3 p.ct. Mr. West, in his example, is in luck's way, compared with certain other gas undertakings. But quiescence has never yet supplied the road to redress or reform. He therefore thinks the industry should in combination insist upon a simple piece of work of such imposing economical result being performed —work which can be well undertaken by women. He uses the word "imposition." The expression is largely consistent with the facts. The Coal Controller insists on the conditions of the Price of Coal Limitation Act being complied with; and he has defined the profit per ton for coal factors and merchants. But are the decrees of the Price of Coal Limitation Act truly complied with by the sale of (say) an additional 10 p.ct. of valueless material? Our answer is distinctly in the negative. The protection intended by the Act against an undue increase of price is largely neutralized by what some collieries are doing in selling as genuine coal millions of tons per annum of inert material; and, according to some reports, the shifting of contracts under the Coal Controller's redistribution scheme promises to produce some unpleasant experiences of the raising of the proportion of unproductive material. If there is further laxity on the part of collieries in this direction, there is going to be an addition to the excess which the collieries are indirectly drawing from consumers beyond the 4s. limit per ton.

This is obvious. Take a coal that formerly contained between 5 and 6 p.ct. of ash, and assume for argument that it cost at the pit 12s. a ton in 1913-14. Some such coal now contains between 15 and 16 p.ct. of inert material, and the contract price at the pit is (say) 16s. The increase of the unproductive material by 10 p.ct. means that the collieries are being paid 16s. for 0·9 ton of material equal in quality to that formerly supplied, and so are securing 4s. per ton extra *plus* 10 p.ct. of the 16s., or 1s. 7·2d., for the increased unproductive material. So that for the coal (*quâ* coal) actually supplied, the colliery is receiving 5s. 7·2d., instead of 4s. The imposition does not stop there. The cost of picking is saved; and the purchaser has to further patronize the colliery to the extent of the loss of production occasioned by the extra percentage of refuse. The Act overlooked the penalizing of purchasers by artifice, for which the lame excuse of wagon delay is put forward, though wagon capacity waste is, at the present time, far more important to the country.

New Coal Price Instructions.

Coal sellers and buyers are having a restless time; but it is hoped that what is now being done will mean a period of peace till the next contract season comes round, and then possibly, if the war is still in full swing, "repeat orders" will suffice. Instructions were issued last week by the Coal Controller, Mr. Guy Calthrop, as to the prices of coal under contracts, including the abrogation of all contracts, so far as prices are concerned (but not deliveries) as from the 10th inst., in order that they may be revised, according to the instructions, and be given current legal exactitude. Some coal buyers will be grateful; others will not be. Those who are will be those who will materially benefit; but those coal sellers who have to shed part of their contract prices will be correspondingly ungrateful. It is impossible to content all. But Mr. Guy Calthrop, as Coal Controller, is evidently the right man in the right place. He is diplomatic. He prefaces the present sweeping instructions by telling the colliery owners what conscientious men, in the main, they have been in complying with the Price of Coal Limitation Act. There is no room for any charge of profiteering against the great body of them. There are cases where there have been prices in excess of the allowances under the Act; but, where the excess is small, it is quite probable that it is simply due to variations in the interpretation of the terms of the Act, though he cannot say that this applies to all cases.

But it will strike the average man that, if comparatively few contracts were concerned, there would be no need for so drastic a move as the cancellation of the whole of the contract prices in order to secure accurate alignment with the Act. Judging from the character of the instructions, the Coal Controller knows more than he admits in black and white. He is probably as much aware as we are that there are a good many cases of buyers who, while they have cause of complaint, have not complained, feeling that the excess price had better be tolerated than risk any trouble in the delivery of coal. He also apparently knows, as he has legislated for such stratagem, that there are collieries that have refused to make contracts with old customers, in order to obtain better prices from those with whom they have not previously made contracts, or by selling in the open market. It is really remarkable how comparatively small is the professed knowledge of the Coal Controller as to any unrighteous acts or artifices to evade the Act on the part of the colliery owners, but how well he has compassed them all in his new instructions, which we quote *in extenso* in this issue. Another feature that will be observed is that the Controller has followed the constructions put by the Board of Trade upon the main provisions of the Act. For one example, the corresponding prices forming the basis of contracts are to be those actually agreed in the year 1913-14, and not the prices made before July 1, 1913, for coal delivered up to June 30, 1914. Again, it is not obligatory that the corresponding contracts should have been with the purchaser. This would be impossible in numerous cases under the coal redistribution scheme. So long as the conditions have fair correspondence, or are the nearest approach to those of the new contract, that is all that is required,

subject to certain conditions. Purchasers of coal by contract must not neglect to find room immediately in their already well-stuffed minds for these fresh instructions, as they cannot now infringe the Act by paying more than their legal due for coal, any more than the seller may do so by charging more than the prescribed amount. The Act commands respect from both purchaser and seller; and the Coal Controller intends to see that there is obedience.

Tar Favours to Come.

Despite the work that is being done by the gas industry for the nation, and the heavy demand by the Government for tar products (payment for which is made on an ungenerous scale), a weak spot in the revenue for secondary products is tar. No chairman of a gas company in dealing with tar at a meeting of stockholders has, at the present time, a particularly kind word to say for it; and he passes over it slightingly, just as over the Government controlled sulphate of ammonia, which is also reluctant in disclosing any signs of the generosity which is meted out to other industries engaged on war work. Of course, pitch exportation has been practically impossible; and there has not been the same absorption of tar in various directions that existed prior to the war. The seventh annual report of the Road Board reveals this in connection with the work over which the authority presides. At present, its work is light compared with what it has been, and with what it will be later on through the wear and tear on roads, directly or indirectly attributable to the war, and the revelations that have been made as to the necessity for (as early as possible) a large reconstruction of main roads, with the view of meeting the increasing motor traffic, the wearing and vibratory actions of which upon the roads are altogether different from the old steady-going horse traffic. Stronger roads are now needed, and the increased cost of these roads will mean that greater care will afterwards have to be taken of their surfaces. While the gas industry does not feel exceedingly glad over the present demand for pitch and dehydrated tar for road purposes, it can at any rate look forward to the considerable promise there is for these commodities in future road reconstruction, repair, and upkeep. Pitch will be largely required as a binder in the remaking of roads in the more robust style required by modern traffic; and tar will be considerably applied in resurfacing work. The after-war outlook is good in these directions. But the present does not show any improvement. The Board announce that during the current year they are distributing, with Treasury sanction, the sum of £200,000 out of the Road Improvement Fund, principally in the form of assistance for the tar treatment of main county roads, which are in a suitable condition for such treatment. By this means something is being done to secure the preservation of roads that were improved prior to the war. But the £200,000 does not mean this sum spent on tar alone. It has to be spread over all the expenses attached to tar treatment; and what is the tar absorption power of £200,000, in comparison with the volume of dehydrated tar produced from the millions of tons of coal carbonized by the gas and coking industries?

Back to Longer Lighting Hours.

We all put back by one hour our clocks and watches before going to bed on Sunday night, though the official time for doing this was not until three o'clock in the morning. The change will at once effect a difference to the draft for lighting purposes upon the mains of gas undertakings, which have not by any means had any cause this year to regret the existence of the Summer Time Act—in fact, they have been pleased to have its friendly aid in the circumstances of the times. Those people who revel in statistics as one of the most entertaining features of our mundane existence will have some difficulty in effecting any computation as to the economy to the country of the saving of lighting gas owing to the extension of evening time by one hour. At best, the result could only be guesswork; for the sales of gas during the summer time have this year been greater than ever, notwithstanding the shortened use by one hour for lighting, Comparison being made with last year when daylight saving was also the rule, we have before us increases of consumption ranging for different undertakings during the summer months between 5 and 6 p.ct. up to 17 p.ct. Other figures not in our possession might carry the increase higher still. Such percentage augmentations wholly obliterate the economy effected in lighting. To ascertain the cause of the increase does not require any particularly acute penetration. Householders have during the summer time simply been shifting more than usual the obligation for providing them with heat for domestic purposes from their own shoulders to those of the gas purveyors; they have also been helping the Coal Controller and coal merchants in respect of the coming winter's pressure, by the frugal use of such coal as they could obtain and could store away in their cellars; some, too, may have hearkened to, and acted upon, the appeal of Ministry of Munitions to use more gas. There are various causes for this summer time increase of gas consumption. But it will all do good. Reliance upon the gas-mains during war-time will promote reliance upon them when the war is over. It will all help to suppress the irrational use of coal and to promote its rational use. And that is one of the things that is to serve in the economic development of the country. If gas undertakings had had an extra hour's lighting on top of the excellent increase of summer time consumption, well they would not have been able to stock their coal stores quite to the same extent as they have done in anticipation of a difficult winter.

Employment of Women in Gas-Works.

Useful information, brought right up to date, is furnished by the second edition of a series of pamphlets, prepared by the Home Office and the Board of Trade on the subject of the substitution of women in industry for enlisted men. Readers of the "JOURNAL" have had numberless opportunities of learning, from those responsible for the management of gas undertakings, what is already being done in this connection; and the particulars thus published from time to time have made a very excellent showing. But no doubt, in certain directions, it is possible for still more to be accomplished in this way; and that is the justification for the re-issue of the pamphlets giving the results of the further developments which have taken place since the first edition made its appearance last year. The series is a lengthy one, consisting of 27 pamphlets; and the contents of that relating specially to gas-works are reproduced in the news columns of this issue. A study of this will prove suggestive to managers who may not yet have taken full advantage of the possibilities of female labour. In the pamphlet, emphasis is laid upon the fact that, "in the interests of the nation, it is of vital importance that every manufacturer who is producing articles required for the prosecution of the war, for the support of the population, or for the export trade, should make every effort to maintain his business at the highest possible pitch." The efforts which gas undertakings have had to make to this end have been of a far wider character than is involved merely in the substitution of women for enlisted men.

Coal Gas for Motor Cars after the War.

In a short reference, in our news columns, to coal gas as an alternative to petrol, the remark appears: "It is argued that coal gas will be dropped after the war, or as soon as the price of petrol comes down. That may be a long time yet." There is room for doubt as to whether coal gas will receive summary eviction for this purpose after the war, or as soon as the price of petrol comes down. Much, of course, depends upon the latter event, and its extent. But we are a little dubious as to the price of petrol making a heavy decline immediately after the war. Of course, there will be more tank-steamers available than there are to-day for the general trade in petroleum and its products; but there will be hundreds of thousands of motor cars of all descriptions, new and old, all waiting to commence the absorption of petro or some other motor spirit, and their number will grow at the unprecedented rate at which car manufacturers of the world will then be able to turn them out. During the war America has been making cars in number that has had an important effect on the demand for petrol. Simultaneously the rate of motor spirit production has not (this quite apart from the shipping question) been keeping pace with the growth in the rate of the world's demand, nor is there any prospect of such a condition, calculating from known data. Thus it is not at all likely the price of petrol will decline to pre-war rates; the probability rather being that there will first of all be a fairly substantial drop, and then, as the demand grows, it will make an ascent which will give advantage to other motor fuels. For this and another reason, we do not

think that coal gas will after the war be entirely dispensed with as a motor fuel. The other reason is that brains are busy on the problem of constructing light metal containers which will carry gas at a fairly considerable pressure. If these can be developed —with coal gas showing an appreciable reduction of fuel cost per mile or per ton-mile compared with petrol at normal prices—users of, at any rate, trading cars will be looking at the matter not from the æsthetic point of view, but from that of £ s. d. War experiences have proved that coal gas leads in lowness of fuel cost for motor purposes, and this will be a big consideration with the man of business.

Gas-Container Connections.

Those who are interesting themselves in the making and fitting of flexible or other gas-containers for motor-car use, as well as purveyors of gas, are asked to give special attention to the letter in our "Correspondence" columns by Mr. Leo. Swain, the Chairman of the Manchester, Liverpool, and District C.M.U.A. He finds that all sizes of connections are being used for the gas-containers now being supplied for motor vehicles. That is a great pity. There must be a universal standard, in order that trouble may be saved and expeditious filling assured wherever a car may be. He suggests, too, quotations for gas for this purpose at per 100 c.ft.; and there is no difficulty about this. Another point which would save time would be the marking of containers with their capacity, as attested by a gas undertaking, so as to avoid measurement and the reading of a meter every time a container requires refilling. This is a new business; and we may as well get on to an economical basis for business transactions as early as possible.

PERSONAL.

Mr. James Woods has been appointed Manager of the Clones (co. Monaghan) Gas-Works, in place of Mr. Edwin Davies, who has accepted the managership of the Cavan Gas-Works.

Mr. D. Macintyre, of Dundee, has been unanimously appointed Engineer and Secretary to the Montrose Gas Light Company. Mr. Macintyre succeeds Mr. James Mitchell, who is now Chief Assistant at Dundee.

It is, says "The Times," understood that Sir Arthur Steel-Maitland, Under-Secretary for the Colonies, will be the Parliamentary Secretary of the new Department [to which reference was made on p. 456 of last week's issue] that is being created to improve the existing commercial intelligence system.

On reaching the age-limit next month, Sir Arthur Whitelegge, K.C.B., who has held the appointment of Chief Inspector of Factories and Workshops at the Home Office for more than 21 years, will retire; and the Home Secretary has appointed Mr. H. M. Robinson, the Senior Deputy Chief Inspector, to succeed him. An arrangement has been made by which Sir Arthur Whitelegge will continue to give his services to the Factory Department in an advisory capacity on questions of a technical and scientific character.

Three weeks ago, we had to record the death in action of Mr. Stanley Edward Pilbrow, of the R.F.C., the second son of Mr. Edward Pilbrow, Inspector in charge of the Westminster Office of the Gas Light and Coke Company. Mr. Pilbrow's bravery and splendid behaviour generally were, it will be remembered, testified to by those who knew him at the front; and now we are pleased to learn that his father has had the gratification of being informed that, in addition to being graded a Qualified Ariel Gunner the day before his death, his son was awarded the Military Medal earlier the same month.

Obituary.—Alderman Alexander Gillies, the "father" of the Gateshead Town Council, who died last week in his 96th year, was for a long period a Director of the South Shields Gas Company.

Eastern Counties Gas Managers' Association.—In addition to the discussion on "War-Time Experiences of Gas-Works" to be opened by the new President (Mr. J. H. Brearley, of Longwood) at the autumn meeting of the Association on Friday of next week, there is some formal business to be transacted. Communications will also be considered from the Midland Association of Gas Engineers and Managers and the Wales and Monmouthshire District Institution of Gas Engineers and Managers with reference to "The Representation of the Gas Industry on the Coal and Coke Supplies Committee" and the "Schedule of Protected Occupations and Gas Undertakings." The meeting will be held [on Sept. 28] in the Queen's Room at the Holborn Restaurant; and at the close of the meeting tea will be served to members and visitors. The chair will be taken at 2 p.m. by the retiring President (Mr. J. Terrace, of Grimsby).

ELECTRICITY SUPPLY MEMORANDA.

It seems possible that electricity supply administrators and engineers will become divided into two parties over the character of the great scheme that is expected to electrically regenerate the country. As we have pointed out before, there is a decided tendency among the municipalities not to relinquish their privileges, if they can possibly avoid it, and the companies have no intention of voluntarily stepping into a condition of things that may place them in the power of the municipalities, or in that of any board or organization that is built up with a preponderance of municipal representation in its constitution. On the other hand, there are those who are not negligible who are looking to the large ideals that compass the establishment of some central regulating authority, the creation of extensive generating stations, and the saturation of the country with cheap electricity, which is not alone to be done by more economical generating costs. The Electrical Correspondent of the "Times Engineering Supplement" is not particularly enamoured of the scheme that has been hatched by the Lancashire and Cheshire Committee, with its interlinking, its Joint Board, and its District Board features. He belongs to the school with the higher ideals. He concedes that it is to the credit of the Committee that they are conscious of the deficiencies of the present systems; but he regrets that they have not risen to the dignified state that would allow them in the national interest to abandon local privilege. This appears to be their sin in the eyes of the writer in "The Times;" but his opinion and his generalities are not conclusive evidence that the Committee are wrong and that he is right. He has his eyes fixed upon a revolution; they on starting from existent conditions, and working-up to a new state. The latter can hardly be questioned on the score of being the more economic course. But the scheme is accused of showing conflict between self-interest, local interest, and national interest. May it not be that in the long run it would better serve the end than prematurely laying capital to waste, and creating an immense fresh capital obligation. The municipalities and supply companies are told by the Electrical Correspondent that it does not matter much what they choose to think or propose; the reform which is to give the nation what it requires in the shape of cheap units cannot be left to them. It is the right of the nation that it should obtain electricity on terms proportionate to the national capabilities of electrical generation and transmission. Admitted; but that does not settle the question of the right scheme to attain the end. However, the critic would like to see the electrical conditions of London under practical consideration; and then, with the North-East Coast already admirably provided for, and the Lancashire and Cheshire supply authorities properly burdened with a sense of deficiency, "the situation may yet be saved in time for the period of fierce international competition that will, in the opinion of many judges, follow the temporary post-war boom." The days of miracles are unfortunately in the deep past.

High Ideals.

It shows how general are the optimistic views regarding the future that from both the electricity and the gas industries (which are in a good position to test local and other tendencies) there burst forth here, there, and everywhere fervent expressions of confidence as to the large part they are going to have in the coming reconstruction and development of the country's industry and trading. It is perfectly clear that this is so in relation to the gas industry, seeing that various other industries will be absolutely dependent for their expansion upon that of the work of the gas industry in the matter of swelling its output of secondary products, and that, for heating of all kinds and concentrated power purposes, gas and coke will be in considerable and growing demand. The electricity industry looks to power for its greatest opportunities; and all over the country electrical engineers are hoping to get a slice of the expected new business. Naturally this anticipation has been most evident in the crowded industrial areas; but it is also seen in areas where large industrial factories are not so numerous. At Maidstone, for instance, where the hop and paper industries flourish, the Corporation Electrical Engineer (Mr. E. E. Hoadley) has robust views on the subject. While the last financial year held for him considerable difficulties, he found in it some healthy compensations. He believes, for instance, that the general public has at last realized the many and solid advantages that electricity possesses in fields other than lighting. The Government, too, has awakened to the fact that cheap and ample supplies of electricity are absolutely essential to national development and recuperation, and to the great expansion that will be embarked upon when peace is again established. Mr. Hoadley does not, in his annual report, tell the Council and the ratepayers that it is owing to the past technical deficiencies of the electrical industry that the Government, through the Board of Trade, are now inquiring into plans for improving the electricity supply systems of the country, and that the technical side of the industry is now itself in an unprecedented state of ebullition over the question as to what is best to be done. The electrical position is in a state of flux just now. But it does not matter; it has come to the point where there is agreement that something has to be done that will be better far than the past. However, Mr. Hoadley rejoices. The Maidstone

Confidence.

Electricity Department is going to share in the glorious new harvest, as several large firms have arranged to purchase the whole of their power from the mains of the Corporation. Mentioning this, Mr. Hoadley takes the opportunity of polishing-up for the inspection of his councillors the approved policy of gas and electrical engineers. It is that the greatest service that the supply authorities can render to the community, after making their undertakings commercially sound, is to give it cheap supplies of energy, and not to make large profits to go to the relief of the rates. There are some things in which there is striking accord between gas and electricity people.

Meteor's Logic.

Occasionally there are others over which such accord does not exist. "Meteor" recently had something to say about the little piece of absurdity published in one of the evening papers as to the prospective appointment of a Gas Controller; and we made a few remarks regarding "Meteor's" reference to the matter. These were not to "Meteor's" liking. We drew from what he had to say a very logical conclusion, which he is now pleased to allude to as an "astonishing paragraph." It was as follows: "There may be pacifists and other conscientious objectors. 'Meteor' points out that the pacifists are in a predicament. If they save coal or if they consume gas, they are assisting to win the war and defeat their German friends. Every consumer the electrical industry entices away from the gas industry at the present juncture is an assistance to the enemy; so that those electricity managers and salesmen responsible for such enticement are worse than the avowed pacifists. It is not a gas controller that is wanted, but an electricity controller." On this "Meteor" remarks: "Let us carry our critic's advice to its logical conclusion; let us imagine for one moment that gas displaces electricity *passim*. Even electric-motors in gas-works must go. The munition factories shall drive their lathes and drills and milling machines by gas, the lifts shall carry their freights by the same motive power, the searchlights shall be gas arcs, the thousand and one applications of the electric motor shall become gaseous. Could the war continue for seven days?" Only asses as big as those electricians who used to cry out for, or predict, the rapid extinction of the gas industry would regard as a "logical conclusion" such an argument. It is pseudo logic not mixed with reason.

Electrical Contractors take Advantage.

When the Government sought the assistance of the gas industry in saving the country by the rapid supply of materials for high explosives production, the Ministry of Munitions made it perfectly clear to local authorities that not by tests, legal actions for deficiency, publication, or in any other manner were they to notice deficiencies from standard qualities which would in any way injure the business of gas undertakings, seeing that the deficiency would be occasioned by the work that was being done for the success of the nation in the war. We have looked upon Mr. A. H. Seabrook, the chief of the Marylebone Electricity Department, as being too good a sportsman to take advantage of any temporary deficiency of gas quality in injuring the business of his competitor, or in attempting to defame it in any way in current circumstances. This belief we have no evidence to think need be altered, so far as he is personally concerned. But, on the other hand, we cannot shut our eyes to the fact that there are electrical men who are prepared—some secretly—to utilize the nationally-created difficulties of the gas industry so as to gain business advantage. There are also certain electric papers that are not at all loth to give, directly or indirectly, publicity to a comparatively small drop in the heating value of gas, in order that the electricity industry shall materially benefit therefrom. The attention of the Ministry of Munition ought at once to be called to the manner in which the gas industry's business is caused to suffer through the operations of competitors who have no compunction whatever in utilizing the effects of the national work of the former for the advancement of their own interests. In the "Electrical Times" the other day, there appeared a description of an electric-cooking installation that has been made on the premises of Messrs. G. Cozens and Co., of Edgware Road, though the gas and steam apparatus has not yet been disconnected, probably for safety, as electricity and the equipment have a notorious propensity for failure just at the wrong time. It is stated that the Managing-Director of the firm (Mr. F. B. Wilkinson) casually informed Messrs. Locke and Soares, who were carrying out electrical work on the premises, that there had been difficulty in preparing the meals for the staff owing to "several causes." Shortage of coal for one thing made it troublesome to maintain the steam supply; labour difficulties made it difficult to maintain continuity of supply, even if the fuel were available; and then (so the "Electrical Times" asserts) "the quality of the gas had deteriorated very materially during the last year or two, so that it was only with difficulty the cooking could be carried out."

An Alleged "Material" Decrease in the Thermal Value of Gas.

The fact that the statement as to the quality of the gas is put last in the list indicates that its so-called "material" deterioration was the smallest difficulty of all; and this is confirmed by the further statement that, prior to the conversation with a representative of Messrs. Locke and Soares, Mr. Wilkinson had intended "to place an order with the Gas Light and Coke Company for gas-heated apparatus to replace that previously heated by steam." But then "Mr. Soares pointed out the advantages of electrical operation." We should much like to have a faithful account of what was said on the occasion. Now the fact that during war time some of the largest hotels, restaurants, and clubs in London do all their cooking to time and to the satisfaction of their clients—in many cases considerably more per establishment than Messrs. Cozens and Co. have to cater for—by gas supplied from the mains of the Gas Light and Coke Company shows that there is not much to be said against the quality of the gas. Moreover, the work that is being done by the Company for the Government, while to some extent divesting the gas of the constituents that give luminosity to an open gas-flame, only diminish to a negligible percentage, as independent official records prove, the calorific power of the gas. In the circumstances, what does the "Electrical Times" really mean by the published assertion that "the quality of the gas had deteriorated *very materially* during the last year or two, so that it was only with difficulty that cooking could be carried out." Is this a statement that can be defended? Is it a statement that ought to be published either as a matter of fact (in face of the official testings) or in fairness, in view of the depreciation, such as it is, being due to the supply of high explosives to our forces, and in view, too, of the instructions in the matter given to all local authorities in order to defend the gas industry? Is it a condition that justifies a diversion of business from the gas company at the present time? Even now less than 7 c.ft. of gas will give more British thermal units than the electrical unit, which has only a value of 3420 B.Th.U.! Small wonder the Marylebone Electricity Department are only charging Messrs. Cozens 0·5d. per unit for cooking purposes; and this with war time producing costs prevailing. It tells a tale of need in comparison with the heating value given by gas. The report also states that the Marylebone Electricity Department has run-in a special three-wire direct current service for the cooking supply. This, with all the adjuncts, must have cost a pretty penny. Who paid for this? If the department (which has been raising its prices to ordinary consumers), is the cost covered by the 0·5d. per unit? We know that some extraordinary things have been done by the electrical people in order to get a footing in the cooking business with the low thermal valued electrical unit, the slowness of operation, and the uncertainty. Mr. Wilkinson appears to have been duly informed as to the fable of the greater wastage of meat by gas operation than by electrical. Perhaps his own common sense has since suggested to him the question: Given the use of the same temperature in a gas and an electric oven, the same length of time for the cooking, and the same weight and constitution of joint, why should there be any difference in the weight of the cooked meat? Perhaps, too, his own commonsense has induced the question as to whether, if B.Th.U. cost so much less by gas than by electricity, it is posssible for all the work that has to be done on the hot-plate in the way of boiling operations to be carried out as cheaply and as quickly by electricity as by gas?

A Sign of the Times.

With the demand for energy for munition production, there are electricity undertakings that are much pushed for generating power, and are not likely to get more until after the war. There are other undertakings that wish they were pushed by demand, but they are not. The only thing by which they are pushed is the problem as to how to make both ends meet, and that problem they have not been able to solve. The curbs on unnecessary capital expenditure, the labour difficulties, the expenses of material, and the troubles over fuel supplies have each and all contributed to bringing some electricity undertakings, as has been the case with gas undertakings, into a condition where it is impossible without danger to do more business at times of maximum demand than that already provided for. Several gas undertakings have had, much to their regret, to make a firm refusal to the request for the fixing of more gas cooking-stoves and gas-fires, solely on account of the possible use of connections already having at periods of maximum demand outstripped plant capacity. But we do not know the case of a gas undertaking (this probably owing to the advantage due to storage) that has yet come to the position in which it has had to contemplate the disconnection of "non-essential" consumers. The Cheltenham Corporation Electricity Department is in this position. According to an electrical contemporary, the Committee have decided to apply to the Board of Trade for sanction, under the Board's regulations, to disconnect classes of non-essential consumers in cases of necessity, in order to enable the supply to be continued to essential consumers.

Prices of Superphosphate.—The War Cabinet have fixed maximum prices for the sale of superphosphate in the United Kingdom on the basis of a delivered price of £6 5s. for 28 p.ct grade, if delivered in December, with a reduction of 1s. per month before December and 1s. per month rise from January until May, 1918. Therefore, 30 p.ct. superphosphate costs £6 10s. From 30 p.ct. downwards, there is 2s. 6d. per ton reduction for each complete unit; from 30 p.ct. upwards, an extra 4s. for each complete unit. Prices are for net prompt cash, in makers' or vendors' bags, delivered by rail or water to consumer's neares railway station or wharf. An order to this effect has been issued by the Ministry of Munitions; and a circular explaining its provisions can be obtained from the Food Production Department.

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JOURNAL OF THE INSTITUTE OF METALS.

The fact that this week at the autumn gathering of the Institute of Metals part of the proceedings will bear upon the use of gas for melting purposes, will serve to remind of the annual general meeting in March, when a number of papers of exceptionally close interest to "Journal" readers, and written by authors well known to them, were submitted for consideration. The occasion was an important one, from the point of view of the gas industry; and it is, therefore, a pleasure to draw attention to Vol. XVII. (Metal Melting Number) of the "Journal of the Institute of Metals," which is edited by the Secretary (Mr. G. Shaw Scott, M.Sc.), and published, price 21s. net, at the offices of the Institute, No. 36, Victoria Street, S.W.1.

Abstracts of the papers dealing with gas were given in our pages at the time; but in this volume those who are desirous of securing all the information available will find the different papers set out fully with illustrations, and a detailed report of the combined discussion. In the contributions of nine authors the latest information is afforded with regard to the subject of the melting of the non-ferrous metals. Those more especially referred to here are Mr. J. W. Hocking, of the Royal Mint, where great economy has been effected through the complete displacement by gas of the old-fashioned coke-furnaces; Mr. G. B. Brook, of the Sheffield Non-Ferrous Metals Branch of the Ministry of Munitions, who deals with coal gas as a fuel for melting non-ferrous alloys; Messrs. H. M. Thornton and H. Hartley, M.Sc., who refer to the same fuel for the melting of brass and copper in a crucible furnace; and Mr. C. M. Walter, B.Sc., who describes metal-melting by means of high-pressure gas. The claims of electricity, crude oil, and pro-producer gas are also capably dealt with. There is, in fact, an immense amount of useful information on the subject of metal-melting scattered through the volume, which will be invaluable to all called upon to make a careful study of the matter.

Other papers, too, are reproduced; and there is a section, consisting of fifty pages, and containing concise summaries of metallurgical communications published in every part of the world during the last six months, as well as a bibliography. The Editor and the printers have, in spite of the unprecedented obstacles by which such work is now confronted, succeeded in completing their task close up to time—and, more than that, have done it well.

COAL GAS FOR MOTOR TRACTION.

By Sydney F. Walker.

The present writer claims to have been the first to make the suggestion that coal gas can be employed for motor traction. This was some years ago; but it was only when the shortage of petrol set in that the attention of practical motor men was turned to the matter. The success of the experiment at Beeston, and on the char-à-bancs running between Eastbourne and London, is exceedingly encouraging; but the flexible gas-bag that is employed in these cases can only be considered as a very temporary arrangement, and a very crude one.

The writer's original suggestion was that gas should be compressed to as high a figure as possible, and carried on the cars in receptacles specially constructed for the purpose; and he believes that this will be the eventual outcome of the movement. He would, *en passant*, remark that one very important advantage of the use of coal gas in place of petrol is the elimination of the carburettor. Under present temporary conditions, where petrol is often used to assist the coal gas, the carburettor has been allowed to remain in place. But when gas has thoroughly established itself, there will be no reason for carrying this apparatus; and that in itself will be a very great gain.

The carburettor is one of the most delicate parts of the whole of the motor-car equipment. Motor-car troubles are due almost entirely to one of two parts of the apparatus—either the electrical ignition or the carburettor. Modern carburettors have been enormously improved, in common with other parts of motor-car equipment; but cases still occur of stoppage due to the filling-up of the jet, owing to some very small object having been allowed to remain in the petrol, and finding its way through into the jet. In addition, the regulation of the richness of the petrol mixture, under various conditions of traffic and load, is very difficult; and this has led to the complication of the apparatus in many ways. With coal gas, the regulation of the richness of the mixture should be very simple.

The writer would also suggest that, if and when compressed gas is carried on the car, the suction stroke and compression stroke of the engine may be dispensed with; and the two-stroke engine (which is the ideal of many motorists) may come right into its own. It will be remembered that with the two-stroke engine there is an explosion at every revolution; so that practically an engine of half the size ought to do the same work as one working on the four-stroke cycle. Under present conditions, the two-stroke engine is fighting a hard battle; but with coal gas it ought to have a "walk-over."

There are two principal difficulties in the way of the adoption of compressed gas—the cost of compression, and the weight of the containing cylinders. The space occupied by the cylinders is also, of course, a matter for consideration. The cost of compression, according to the figures given in the recent "Bulletin of the B.C.G.A.," should not be serious. With a small compressor, apparently the expenditure of 70 c.ft. of gas should accomplish the compression of 1000 c.ft. to a pressure of 300 lbs. per sq. in.; while with a larger plant the consumption is reduced to 62 c.ft. Probably, with larger compression plant, the consumption would be reduced still further. At a gas-works, once the engine and compressor were installed, the other charges should be trifling, as the attendance required is also very small.

The matter of the containing cylinder is more serious; but with the different alloy-steels that have been introduced during the last thirty years, in which the tensile strength and elastic limit have been so greatly increased, the weight of a perfectly safe cylinder for very high pressures should be brought within practical limits, once steel manufacturers are free to give their attention to it. The wire-wound cylinder that was described in the "Journal" for Aug. 14, p. 280, is very promising, though it is not clear as to whether there is an inner containing cylinder as well as the spirally-wound wire-coils. In the modern rifled gun, from which the idea is taken, there is an inner steel tube, and wire of square section is wound on the outside—the object being to utilize the high tensile strength of the wire under the best conditions.

CHEMICAL DISCOVERIES AND PROCESSES IN GERMANY.

According to the "Board of Trade Journal," the "Neue Zürcher Zeitung" recently published a review of German activities in technical matters in the field of war economics, in which it is stated that systematic investigations into the properties of pit coal have been carried on by the Kaiser Wilhelm Institut für Kohlenforschung, and have yielded important industrial results. The treatment of coal with liquid sulphurous acid at ordinary temperatures has produced viscous, golden-yellow mineral oils; the amount produced being 5 kilos. per metric ton. A process has also been elaborated by which through heating naphthalene under pressure, in the presence of aluminium chloride, an oil is produced which can be used for illuminating purposes in the same manner as petroleum. Finally, by treating with ozone, it has been found possible to alter the carbon compounds in coal to compounds soluble in water, the chemical importance of which cannot be at present estimated.

The utilization of lignite has been greatly extended. In the first place, it is being used extensively as a fuel in the industrial establishments which have recently sprung up in the Central German lignite fields, especially in the neighbourhood of Bitterfeld and Halle a/S, where the German air-nitrate factories are situated. A process has been discovered by which nearly twice the usual amount of ozokerite can be obtained from lignite; and the gas is being more extensively used for heating and smelting purposes. In the field of the exploitation of nitrates directly from air, a new process has been discovered, which works with quadruple air velocity through the reaction space, and produces a result about 80 p.ct. higher than could be obtained before.

In the metal industry, further progress has been made with the production of substitutes for copper, brass, and bronze; special mention being made of the different zinc and lead alloys, and of the increasing importance of aluminium. Recently, there have been new developments in ore smelting. With copper schists, the metallurgical possibility of going as low as 0·7 p.ct. has been shown; whereas formerly the average lower limit was 2·5 p.ct. Operations have been commenced upon large deposits of sandstone containing white lead. Successful experiments have been made in obtaining aluminium from clay, which will, it is claimed, make Germany in future independent of foreign bauxite. With nickel ores, the workable limit has now been reduced from 2·5 to 1·5 p.ct. A process has also been discovered for obtaining nickel and cobalt from pit waters containing these substances.

Oil and Oil Products from Coal.—According to a report to his Government by the United States Consul-General at Cape Town, says the "Board of Trade Journal," Angola coal deposits offer excellent possibilities for the production of oil and oil products, though the coal itself is of no great utility as fuel. The coal is said to be found in large quantities at Quilungo, which is only 90 miles from the port of Loando and about 7 miles from Zenze Railway Station, to which it is to be connected by rail in the near future. The coal is very easy to mine, being accessible by means of adits to the mountains; and it is now being worked to supply a Government contract. The contract coal is used for fuel; but the product in its raw state is said to be too bituminous for this purpose. It has much more valuable products, which a chemist has been extracting from it by means of a small still. It has been found that the coal, after being in the still, resolves into 31 p.ct. of crude oil, and 56 p.ct. of coke, which is a satisfactory fuel for engine-boilers. The oil has been submitted to various refining processes; and samples have been obtained in the form of good benzene suitable for cleaning, petrol for fuel, paraffin suitable for illumination or fuel, lubricating oil, and vaseline. A company has been formed for the exploitation of the mines.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Report of Proceedings at the Annual Meeting.—Concluded from p. 467.

IN consequence of the deranged condition of the postal service, it was only possible, as then intimated, to publish last week a report of a portion of the proceedings at the fifty-sixth annual meeting of the North British Association of Gas Managers, which took place on the 7th inst. in Glasgow, under the presidency of Mr. JOHN LANG, of Alexandria. The question under discussion at the stage at which we were compelled to break off last week was the proposed Gas Council for Scotland; and from the conclusion of Mr. Vass's remarks the report is now resumed.

PROPOSED GAS COUNCIL FOR SCOTLAND.

Following on the speeches that have already been recorded, the subject was taken up by

Mr. LAURENCE HISLOP (Uddingston). He said that, unless it could be arranged that the representatives from the gas companies on the Scottish Gas Council were equal in number to those from the large corporations (such as Glasgow, Edinburgh, Dundee, and Aberdeen), there was just the fear that questions would be approached from the point of view of the benefits that were likely to accrue to the corporations. Unless the representation could be equalized in some way, there was rather the danger that decisions might be arrived at which were adverse to the interests of private or statutory gas companies. If this difficulty could be got over, then the suggestion made by Mr. Vass appeared to him to be a splendid one. So far as statutory companies were concerned, he believed there were only three that fell to be included in this category in Scotland—at least, that was all he could recall at the moment. He was altogether in favour of any movement which would deal with questions that affected the interests of gas engineers individually. If matters of this kind were taken up by a responsible body with some influence and weight behind it, then he believed that greater benefits would accrue.

The PRESIDENT remarked that something could be done to secure equalization of representation as far as possible. It rested with the Association to make certain Mr. Hislop's idea was given effect to.

Mr. SAMUEL GLOVER (St. Helens) said he was aware of the correspondence that had been going on between the President of the North British Association and the National Gas Council of Great Britain and Ireland. As a matter of fact, he was present at the meeting of the Executive Committee of the Council the previous week, when the letter that was submitted to the present meeting [*ante*, p. 467], in reply to the President's inquiry on the subject, was drafted. Speaking for himself, he could say that he was very anxious to preserve unity of action in the industry. Unity did sometimes work towards strength; and his main reason in speaking that day was to combat the suggestion that had been made, that the business which was conducted in London tended to conserve the interests of one particular part of the country more than another. A suggestion of this kind did not ring true, so far as the work of the National Gas Council was concerned. Proceeding, he (Mr. Glover) said he felt perfectly sure that their Scottish friends did not desire to be copyists. After all, there was something in a name; and, in proposing to establish a Scottish Gas Council, it looked as if they were trying to take this matter entirely into their own hands—having only the interests of Scotland in mind. He put it to them that in any instructions they proposed giving to the Special Committee who were to deal with the proposal, there should also be a remit to settle the name that was to be given to the new department of the Association's work. He appealed to them in the name of unity and strength for the future to realize that the National Gas Council existed for the purpose of serving the national interests of all gas undertakings as far as it possibly could. The Council quite agreed that it could be helped in its activities if there was a branch in Scotland, focussing the needs of the Scottish section of the industry; but it did suggest that the Scottish branch ought not to be called the Scottish Gas Council. Notwithstanding all Mr. Napier had said in his strong, eloquent, and argumentative address, he (Mr. Glover) gathered it was proposed that the new Scottish Gas Council should look to the National Gas Council for help. In Scotland, they were going to strike out on a new branch of their own; but at the same time they proposed retaining a hold of "Mother's apron strings," in the hope that, when occasion arose, they would get hold of "Mother's hands." It appeared to him that all ideas on the subject might be satifactorily adjusted if they could, in Scotland, take up certain detail work by way of assisting the National Gas Council, and while doing so arrange for the National Gas Council to retain its position, name, and influence in the industry.

Mr. A. MASTERTON (Edinburgh) said that, while quite in sympathy with the important step contemplated, he was anxious to prevent, if at all possible, any misunderstanding with the National Gas Council. He thought it advisable, in the first instance, that they should appoint a Committee to confer with the Executive Committee of the National Gas Council. It struck him as being prudent that they should do this because, as things were, they did not know about the position that the National Gas Council might take up on the whole question. For example, they might ultimately turn round and say: "Oh, we want to have nothing whatever to do with this new movement in Scotland." If a conference was arranged, it would then be possible for the proposals from Scotland to be placed before the National Gas Council in a fair, straightforward, and honest way. To his mind, the course he had outlined would be the safer way, because there was no question but that they must act in accordance and in conjunction with the National Gas Council if they desired to have weight in any of the applications they put before the authorities.

Mr. J. W. NAPIER interposed at this point with the information that the previous Monday, the President (Mr. Lang), the immediate Past-President (Mr. Masterton), and himself had an interview in Edinburgh with Mr. Goodenough. They then pointed out to Mr. Goodenough that they were most anxious to continue collateral interests with the National Gas Council; and with this suggestion Mr. Goodenough quite agreed. Mr. Goodenough was strong on this point, that in Scotland they should not constitute themselves a separate body from the National Gas Council. He might say at once that this was not at all the intention.

Mr. ALEX. WILSON (Glasgow) said he felt that the whole root of the trouble under discussion was due to the small representation that was given to Scottish engineers on the Council of the Institution of Gas Engineers. On this point he rather felt that there had been some laxity in the North British Association in not nominating gentlemen at the proper time as representatives for Scotland on the Council. If nominations had been sent forward at the proper time, there did not seem to be the slightest difficulty in securing greater representation on the Council from Scotland. He made this observation because of his past experience as a member of the Council for some time. The Institution of Gas Engineers desired that there should be a fair representation on the Council of all parts of the country; but, of course, if nominations were not made timeously, there seemed little justification for complaint now. If the Scottish gas industry had been more numerously represented on the Council of the Institution, it was just possible that Scotland's representation on the National Gas Council would have been much more adequate than it was at present. With reference to the particular proposal which Mr. Napier had put forward, he personally did not think it was possible to have two National Gas Councils in the one nation.

Mr. NAPIER: That is not the proposal.

Mr. WILSON (proceeding) said he did not think the name that was suggested "Scottish National Gas Council" was going to help the gas industry at all. It rather seemed to him that, instead of imparting weight to the National Gas Council, it was going to take a little of its weight away. Divided counsels in this way rarely brought about unity; and certainly the separate bodies could not have the same weight and influence with Government Departments as was the case to-day when the National Gas Council represented the whole nation—both north and south of the Tweed. Personally, he thought it would be a great mistake to have the proposed new body described as the "Scottish National Gas Council." It might be possible for them in Scotland to have a Committee capable of dealing with certain matters of interest and importance to the industry; but he did not think it would be advisable to style the Committee the "Scottish National Gas Council." Then he would specially suggest that, before the next meeting of the Institution, steps should be taken to ensure Scotland receiving better representation on the Council of the Institution.

Mr. W. WILLIAMSON (Forres), said he gathered from the discussion that the subjects to be dealt with by the proposed National Gas Council for Scotland were matters which affected managers and their various gas concerns. He rather wondered why it came about that the Council of the North British Association of Gas Managers was not in a position to discuss these questions.

Mr. LAURENCE HISLOP (Uddingston) said that a point had emerged in the course of the discussion in regard to which he thought it was only fair that the members should be provided with the fullest information. There was at present a great outcry for better representation for Scotland on the Council of the Institution of Gas Engineers. Expression had been given to this demand for more adequate representation for Scotland, in the direction mentioned, both at the present meeting and at the Informal Meeting of Scottish Gas Managers. It was well, however, to keep in view the fact that in Scotland there were only some forty of their members who were members of the Institution of Gas Engineers out of a total membership of anything between 800 and 900. With such a paucity of membership, he did not see that Scotland had much cause for grumbling against the Institution. It ought to be clearly explained to the gas managers throughout Scotland that, if they desired better representation on the Council of the Institution of Gas Engineers, it was their duty in the first instance to become members of the Institution.

Mr. JAMES DICKSON (Johnstone) said the members of the Association ought to ask themselves how they were likely to be benefited by a Scottish Gas Council. Then they could also ask themselves what they could have done in the past if such a body had been in existence, and what they could do in the future if it really came into being? On the merits of the general question, he might say at once that he did not quite favour the idea of a body for Scotland which would be separate from, and independent of, the National Gas Council. Then it occurred to him that in their profession and industry, they were at times indebted to many of the extraordinary members of the Association for the inventive genius they displayed. It ought, then, to be considered whether the interests of the extraordinary members should be recognized in the representatives appointed to the suggested new body. He quite agreed the point he had introduced was a somewhat knotty one; but it was one which they might be the better of considering.

Mr. ALEX. MILNE (Aberdeen) explained, at the outset, that he could heartily approve of the suggestion put forward by Mr. Napier in the course of his interesting address. He (Mr. Milne) thought the formation of such a body as was indicated was very necessary indeed; but he was sorry to see the name of the body mentioned as being the "National Gas Council for Scotland." He rather agreed with some of the preceding speakers that if they had one National Gas Council representative of all the Associations, then it made for greater strength

than a number of sectional gas councils. It was said the National Gas Council for Scotland would be affiliated to the National Gas Council for Great Britain and Ireland; but he thought they were already affiliated to that body. They were all members of the North British Association of Gas Managers, and the Association was affiliated to the Institution of Gas Engineers, which, again, was one branch of the National Gas Council. In regard to the name of the proposed new body—for he took it it would be a new body—one could not get away from the fact that the duties so well enumerated by Mr. Napier were in reality duties which ought, under the constitution of the North British Association, to be competently considered by the Council of the Association itself. The trouble was that the Council did not do it; and they did not want to do it. It was felt that there should be only one body, which would not be a moving or changing body, but which would be thoroughly representative of large and small works alike, by whom the various questions which affected the industry from time to time could be fully discussed. He (Mr. Milne) could not help feeling that there was somewhat of a soreness in the minds of certain gentlemen present at the meeting because some of the officials of the larger gas-works in Scotland had been in the habit of meeting and discussing questions of joint interest, and had not given others in the profession the benefit of their deliberations. Speaking for himself, he felt some sympathy for those who took up this attitude of mind. Indeed, he often felt within himself that the managers of the larger works might be considered a little selfish, because they met in the way he had mentioned. This being so, he had some considerable sympathy with the idea that, under the auspices of some properly-constituted body, they should meet from time to time, so that the benefits to be derived from such meetings (if there were benefits) would be spread throughout the whole industry in Scotland. He did not know that there was much in a name; but it rather appeared to him that a difficulty might arise if they were to designate the new body the "National Gas Council for Scotland." After all, this new body was to be part and parcel of the North British Association of Gas Managers; and this seemed to preclude the presence of representatives from municipal bodies or the chairmen of gas companies. This was one point which he thought should be kept in mind. On the other hand, was it not possible that they could have some sort of Consultative Council or Information Bureau for the Scottish gas industry? Of late, he had thought a good deal over this matter of the establishment of an Information Bureau. Certainly, if it were formed, they could help each other a tremendous lot from time to time. How often in the course of a year did they require to write each other on questions (say) relating to wages paid to various classes of workmen? If there was an Information Bureau, the data could be placed at the disposal of all members directly on application. The scope of the Bureau could be widened to take in reports from engineers and managers as to the tests made with coal from time to time, and the suitability or otherwise of certain coals for gas undertakings. If data of this kind was collated by the Secretary in charge of the Information Bureau, it would prove of great benefit to a large proportion of members. There were innumerable questions touching upon parliamentary standards, calorific values, valuations, and so on, which could quite well be dealt with by this consultative body in Scotland, rather than by the National Gas Council. He was quite certain that a number of managers in Scotland must have been put to a great deal of trouble when the National Insurance Commissioners extended their benefits, so far as unemployment benefit was concerned, to many new departments of work. At the time when the subject was specially before him, he communicated with the National Gas Council, asking if they could give him any guidance or information respecting the experiences of others. The Council at the time could not give the desired information; but as a result of individual experience each of them acquired much information on the subject, and if it had been collated it would have proved distinctly valuable. He need not further elaborate this idea of setting up an Information Bureau. There were innumerable ways in which the Bureau would prove useful. He was prepared to go further than a Bureau, because if he could have his way, he would have a library in connection with the Association. Many books were now published in connection with the gas industry; and while it was impossible to purchase individually all the literature that was issued, each member would be quite willing to pay something for the privilege and benefit of having the loan of useful books for reference or instruction.

Mr. WILLIAM WILSON (Falkirk) thought the position in which the North British Association found itself was one into which it had been placed by the Institution of Gas Engineers, and also by the so-called National Gas Council, which was a self-elected body. The opposition which the National Gas Council was setting up showed they were afraid that Scotland would detract from the standing of the Council if she dared to elect any similar body of her own. In Scotland, they felt that at the present moment there were matters of vital interest to the gas industry which demanded immediate attention. They did not know what attention these matters were receiving from the National Gas Council or from the Institution of Gas Engineers; but they did know that the questions were of such a nature as to affect all their interests. Mr. Napier had come before them with a very definite proposal; and if they desired to alleviate the condition of things that had existed in the past, then he thought it was their duty to support it. One matter of vital interest at the present moment was the question of the restricted price for sulphate of ammonia. They would all agree, he thought, that the proposal in this connection was a very unjust one. Then there was the question of tar products; and there again he thought they ought to be getting more than they were doing. Further, very little had been said that day on the subject of the coal control; and he really did not know why. He was thankful to say that the coal control was likely to affect him very slightly; but he did feel that they were simply being brushed aside as an industry. Speaking for himself, he did not think they should overload this proposed Scottish Gas Council—after all, there was nothing in the controversy regarding the name—with work. He did not consider they should saddle it with the duties of an Information Bureau, a library, or anything of the kind; but he did seriously consider that all matters of vital interest to the gas industry in Scotland ought to be attacked at the earliest possible moment. If the National Gas Council cared to extend a hand, and help them in a brotherly way, then they in Scotland would accept their assistance; but they did not altogether relish the suggestion of being mothered. The question of valuation was becoming a serious one in these days. The whole position was very complicated; and it seemed to him something would require to be done immediately to remove a somewhat unjust and inequitable law. As to valuation, they in Scotland were up-against a state of affairs which warranted amendment of some kind or another.

Mr. NAPIER, in replying to the discussion, maintained that sufficient had been said to justify the formation of such a Scottish Council as he had proposed. He desired to emphasize the fact that the proposal was not intended to alienate the interest of the gas industry in Scotland or the profession generally in the country from the duties and responsibilities which they owed to the National Gas Council of Great Britain and Ireland. As regards representation, which was a somewhat sore point in Scotland, it was quite hopeless to expect that Scotland, under the present procedure of appointing members from the Institution to the National Gas Council, would ever be properly represented. His proposal was going to amend this position of affairs very considerably, in so far as representation by the Scottish Gas Council would be asked from the National Gas Council. The Scottish Gas Council would have on the National Gas Council several of its members. As there were so many points in connection with this matter that required to be evolved and determined, he would suggest that the meeting should agree to the appointment of a representative Committee. He was prepared to move that the Committee should comprise the official representatives from the gas undertakings of Glasgow, Edinburgh, Dundee, and Aberdeen, along with the members of the Council of the North British Association of Gas Managers, and when the details of the scheme had been formulated, another general meeting of the Association should be held—preferably on an early date.

Mr. WILSON (Falkirk) seconded the motion, which was carried.

TECHNICAL PAPERS AND DISCUSSIONS.

On resuming (after luncheon) the following papers were read and discussed: "Continuous Vertical Retorts in a Fifty-Million Works," by Mr. H. G. RITCHIE, of Irvine; and "The Dehydration of Tar," by Mr. G. H. SHARPLES, of Glasgow. The papers have already been published [*ante*, pp. 468, 469]; and the remarks to which they gave rise will be found below.

The Paper by Mr. Sharples.

Mr. JAMES DICKSON (Johnstone) wished personally to thank the author for the valuable information he had given in his paper. They were aware that, generally speaking, there were three grades in any subject—the primary, the secondary, and the tertiary. Frankly, it seemed to him that they had listened to the third grade in tar distillation that day. As Mr. Sharples had demonstrated, they put the oil through the plant a second time at the Johnstone Gas-Works; and as a matter of fact they dealt with considerably greater quantities than those shown in the paper. It was, he thought, worthy of note that in the two tests made by the author at Johnstone, the proportion of oil coming off, as compared with dehydrated tar, was a quarter more. The paper, he considered, was one more tribute to vertical retort tar, so far as quantity of oil content was concerned. The grade of benzol, on the other hand, was well known not to be of very much use for the purposes of the Ministry of Munitions. In putting through the oil at Johnstone, Mr. Sharples took off the tar and worked up to a temperature of 130° C. The number of gallons put through per hour was 250—giving a speed of travel of 817 ft. per hour. Then 19 gallons of crude naphtha per hour were recovered, of a gravity of ·900. The time the oil was exposed to heat averaged 10·9 minutes. Another point worthy of note was the very high viscosity of dehydrated tar. The low free carbon content was 5·23 p.ct., as compared with the Road Board minimum of 6 p.ct. It appeared to him that the specification of the Road Board, fixing a minimum of 6 p.ct., had been determined upon at a time when horizontal retorts were more on the market. There was undoubtedly a time when tars with a free carbon content round about 20 p.ct. were common; but the specification was now altogether out of date. He was ready to maintain that the specification stood in need of amendment, because his own experience had proved to him the worth of the tar in question. It had a fairly low specific gravity, a low free carbon content, and a high viscosity. Indeed, as the result of his past experience, he was not disposed to make the slightest endeavour to raise the gravity by adding pitch or any other foreign matter. As the results of his tests at Johnstone, Mr. Sharples had shown that by putting 756 gallons of tar through the plant, a yield of 416 gallons of oil was recovered. These were significant figures, representing pounds, shillings, and pence to many of the gas managers present.

Mr. DAVID ROBERTSON (Dunoon), said he found that difficulty had been experienced in disposing of the dehydrated tar from his works because of the fact that it had a specific gravity of 1·075. The tar to his mind was perfectly suitable for paving and road purposes. Indeed, in his own district it had been used for paving purposes; and the results had been very satisfactory. In point of fact he had not seen better paving work anywhere. The unfortunate thing, however, was that the tar did not meet the requirements of the Road Board's specification. He thought, in justice to all concerned, that the specification should be rectified forthwith; and he rather thought a motion to this effect should be insisted upon by the present meeting of the North British Association of Gas Managers.

Mr. SHARPLES confessed to a feeling of disappointment that the discussion had not been one of greater length. The first part of his paper had been purely preliminary, with a view to inviting, if possible, a full discussion on the whole subject. Mr. Dickson had mentioned that at the Johnstone Gas-Works he put the oils through the plant a second time, and by so doing he was able to secure higher results. He (the author) quite agreed that such a thing was possible; but he would remind Mr. Dickson that the main object of the process was to get off a light oil in one distillation. He was rather afraid Mr. Robertson was

in error in giving the figure 1·075. This was the gravity of crude tar, and a very low gravity at that. He was grateful for the interest shown in the paper; and, although the discussion had been somewhat limited, he hoped the contribution itself would be carefully studied.

Mr. Robertson acknowledged that he was wrong in stating the specific gravity of his tar to be 1·075. He had mentioned this figure in a moment of forgetfulness. The figure he ought to have stated was 1·095, which they would concede made somewhat of a difference.

On the motion of the President, Mr. Sharples was thanked for his paper.

Mr. Ritchie's Paper.

Mr. Ritchie (Irvine) explained that, since writing the paper, he had prepared some notes in regard to steaming [*ante*, p. 469].

The President explained that, as time was somewhat limited, owing to the protracted debates earlier in the day, it would not be possible to allow much of a discussion on this paper. The author's paper was most interesting; and he (Mr. Lang) was sure Mr. Ritchie would be pleased to supplement the information embodied in it by answering any questions that might be addressed to him.

No questions were, however asked, and, on the motion of the President, Mr. Ritchie was thanked for his valuable contribution to the Association's "Transactions."

THE ASSOCIATION'S NAME—PROPOSED CHANGE.

The President said the next item on the agenda was consideration of the following motion which stood in his name: "That the name or designation of this Association be changed from the 'North British Association of Gas Managers' to the 'Association of Scottish Gas Engineers and Managers.'" As he had mentioned in his address, he (the President) thought the present was an appropriate time to alter their name to one which would designate more clearly who and what they were. To his mind, the present name did not convey to the public or outsiders whom the Association really represented; and as a matter of fact more honour was given to the Chairman of the "Informal Meeting of Scottish Gas Managers" than to the President of the North British Association. He ventured the opinion that the reason for this was because the word "Scottish" conveyed something definite to the outsider while "North British" was vague and indefinite. He understood that originally the Association was formed by the Fife, Perth, Kinross, and Forfar Gas Managers' Association and the Scottish Gas Managers' Association combining; and while he did not know what reasons weighed with them when they selected the name "North British," it looked as if it had been chosen as a compromise, as neither Association would wish it to be understood that the other had absorbed it. The name "North British" had certainly well served its day and generation. The members were nearly all Scotsmen; and the bulk of them represented Scottish works. The Council was drawn from the representatives of Scottish works, and it seemed only reasonable that the word "Scottish" should be included in their name and designation.

Mr. James Dickson (Johnstone), in seconding the motion, humourously remarked that he appreciated "Scotch," but he could not understand the term "North British" at all.

Mr. David Vass (Perth) quite agreed with the President that the term "North British" was not distinctive enough. He would suggest, as the basis possibly for an amendment, that the name might be altered to that of "Scottish Gas Association."

The President indicated that he was not unwilling, if his seconder agreed to this course, to adopt the name suggested by Mr. Vass. What he was most anxious about was that the word "Scottish" should appear in their designation.

Mr. J. D. Keillor (Hawick) said that if proof was required of the necessity and urgency for additional driving force behind the Council or the Association generally, it could be furnished in the motion which the President had made. The proposal came at a time when those in high places were calling out for the highest possible efficiency in organization and for unity and brotherliness throughout all industries. It came at a time when they ought to be engaged in the centralizing, standardizing, or development of their organization. The motion made for nothing at all like that; in point of fact it was purely a sentimental proposal. He was determined to oppose it, because he felt that the present was not an opportune time to make any such change as that indicated, in view of the movements that were afoot. He further objected to the motion because he did not think that the name proposed was the best one that could be given to the Association. As the North British Association of Gas Managers, it did not seem to him that their nationality was being at all disputed or challenged. In the circumstances, he would move as an amendment that the Association should in future be known as the "Institution of Gas Managers—North British Section."

Mr. W. Williamson (Forres) seconded the amendment for the sake of retaining the old name. He was brought up in a works from which one of the earliest Presidents came, and he preferred to see the old familiar name retained.

Mr. W. Wilson (Falkirk) moved and Mr. R. Simpson (Cambuslang) seconded a further amendment, that no change should be made in the name of the Association.

On a division, the amendment by Mr. Wilson, to retain the name as it is, was carried by 21 votes to 12 recorded for the motion proposed by the President.

Election of Office Bearers.

The President announced that, as a result of the ballot, the following were the office-bearers for the ensuing year:

President: Mr. Robert Muir, of Galston.
Vice-President: Mr. R. W. Cowie, of Dalkeith.
Councillors: Messrs. A. C. Young, of Arbroath, and James Bell, of Dumbarton.

Mr. Muir returned thanks for the high honour they had conferred upon him by electing him President. He would endeavour to do his best during the year to uphold the dignity of the chair.

Place of Next Meeting.

It was agreed, on the recommendation of the Council, that the next annual meeting of the Association should be held in Glasgow, on a date to be afterwards fixed.

Presentation of the President's Medal.

Mr. Alex. Masterton (Edinburgh) said that a pleasant duty had fallen to his lot—namely, to present Mr. Lang, as a memento of his year of office as President, with the gold medal of the Association. Mr. Lang had discharged his duties faithfully and conscientiously. He had throughout shown excellent prudence and tact, combined with rare ability.

Mr. Lang, in acknowledging the gift, said he would always look back with pleasure and pride to his year of office as President of the North British Association of Gas Managers.

The proceedings thereafter terminated with the usual votes of thanks.

WELDED V. SCREWED PIPE-CONNECTIONS.

According to the "Acetylene Journal," of Chicago, for May this year [Vol. XVIII., p. 604] some supplementary tests have been made to determine the relative strength in tension and compression of oxy-acetylene welded and screwed pipe-connections, under the direction of Prof. F. H. Gibley, in the Machine Construction Laboratory of the University of Kansas. As reported in the March, 1916, issue of the paper, the same experimenters completed tests on the strength of these connections when subjected to internal hydraulic pressure. The results of the latest tests bear out the conclusions given in the first series—viz., (*a*) The strength of the welded pipe connection is practically the same as that of unwelded pipe. By slightly building-up the weld, it can be made stronger than the rest of the pipe. (*b*) The strength of the welded pipe connection is much greater than that of malleable iron screwed fittings. (*c*) Though a careless or inexperienced operator may produce a leaky joint, nevertheless, if the pipe-line is tested for leaks when installed, it should give no difficulty in service.

The pipe samples (cut from standard black steel pipe) were all from the same stock; hence probably of uniform quality. Malleable iron couplings and ties were used for the screwed connections. The pieces for the butt-welds were cut at an angle of about 60° in a pipe-cutting machine, to get the necessary V groove for welding. The T welds were made by cutting a hole in the run and butting the outlet against the run. The ends of all the specimens were sealed by welding-in plugs or discs of boiler plate. Hydraulic pressure was supplied by means of a small pressure pump made for the work. Welded 2-in. and 3-in. specimens failed by splitting along the longitudinal seams of the pipe—the split stopping at the weld. A 4-in. welded specimen bulged under the high pressure, but did not fail in either the weld or pipe seam. Two of the screwed connections failed by a tearing apart of the fitting at the thread. The bursting pressures of the screwed connections were far below those of welded connections; and all failed in the fitting. Great difficulty was experienced in testing the specimens made up with screwed fittings, because the leakage through sand-holes made it almost impossible to reach the point of rupture. Only one case occurred in which there was failure at the weld; and that was merely a leak which did not develop until a pressure of 3850 lbs. per square inch was applied.

The "Coal-Gas for Motors" Campaign.

An active campaign is being carried on by the "Commercial Motor," in favour of the driving of vehicles by coal gas, which it describes as having "proved itself a sturdy yearling." In the current issue, there is a photograph of the first vehicle, a 2-ton van, receiving its charge from the station in the centre of the town which the Keighley Corporation have opened for supplying gas from their high-pressure system. There is also an article dealing with an invention—which has not, however, yet proceeded beyond the laboratory stage—having for its aim to utilize in connection with coal-gas storage for vehicles, the ability of certain substances to absorb gases. This idea, so far as our contemporary has been able to ascertain, has never previously been followed up seriously with coal gas, although the fundamental principles in the most elementary form have been known for at least fifty years. Whereas, it seems, the determination of the methane absorbent was relatively simple, the possible hydrogen absorbents were few in number, and difficult in character. But obstacles have been overcome by taking a minute particle of hydrogen absorbent and encasing it within a particle of the methane absorbent. This imprisoning of one absorbent within the other, in such a way as to form a homogeneous unit, constitutes, it is said, an achievement of chemical science, and is the *crux* of the invention. There is to be in the near future a series of tests on the high road with coal gas stored in this manner. On the following pages of the issue of the "Commercial Motor" now before us there is much further information, including instructions as to how to measure the top of a vehicle for the gas-container; and there are photographs of a Ford light delivery van converted to coal gas (showing a neat proportioning of the bag and a simple design of tray), and of gas-containers under test.

The estate of the late Mr. Walter Spencer, of the firm of Spencer & Son, of Elland, has been proved at £16,579.

WORKING QUALITIES OF SILICA BRICKS.

In a paper presented at a meeting of the American Society for Testing Materials, Messrs. M. L. Bell and C. E. Nesbit allude to the extending use of silica brick in bye-product coke-ovens. Formerly, as a remedy for the shrinkage and settlement common to bricks made of fire-clay only, a mixture with quartzite (which is commonly known as gannister) was used; but the silica brick, by expanding on heating, gave close well-fitted joints, no settlement trouble, and higher conductivity that greatly reduced the duration of the charge.

The quartzite should be hard and dense, containing 98 p.ct. of silica and the remainder equal parts of iron and alumina. It is ground with lime and water; and the degree of fineness and proportion of water used has considerable influence on the strength of the finished brick. The binder generally employed was lime; but iron, alumina, talc, water glass, and other substances had been used with more or less success. The most satisfactory proportion was found to be 2 p.ct., as only 1½ p.ct. did not give a sufficient bond, and larger quantities lowered the refractory properties and strength. The amount of water was varied to suit the composition of the mixture and the methods of manufacture; but about 10 p. ct. was the proper proportion for hand-made brick. A mud too wet would not retain shape on leaving the mould, and if too dry, there would be sponginess and lack of cohesion, corners not filled, &c., tending to low mechanical strength, susceptibility to spalling, and to slag penetration. Improper filling of moulds, dirty palette boards, or careless handling, all contributed to defective product. The drying was accomplished on a hot floor, or in tunnels heated by hot air from the flues of the kilns. On a floor, four to six days were required for 9-in. brick, and longer for larger shapes; but tunnel drying could be completed in 18 to 24 hours. Unless the material was bone-dry right through, it would crack when exposed to heat in the kilns. These were usually down-draught type, capable of containing 50,000 to 150,000 bricks. The green material must be truly shaped, or it would not take a good bearing or stack properly. It would not sustain a load of much more than 100 lbs. per square inch, and must not be overloaded. Shapes should not be placed near fire boxes, or carry much weight, and were frequently boxed-in. The burning occupied 10 to 15 days; the temperature being gradually raised to 1450°, and maintained at this limit for one to three days, according to the size of the kiln. The cooling must be very gradual, and extend to about five days.

Experiments were made as to the effects of fineness of material and compression on the quality of the brick. Three separate sizes were mixed with 2 p.ct. of lime and 9 p.ct. of water, made into standard 9-in. brick, dried, and kilned under similar conditions. Compressions advancing by instalments of 250 lbs. per square inch, up to 2500 lbs., were attended with a slight increase in specific gravity and resistance to impact; but no appreciable difference was observable in percentage of spalls, slag penetration, and expansion. The finest ground mixture was slightly heavier and weaker, and showed large reduction in percentage of spalls—no other difference.

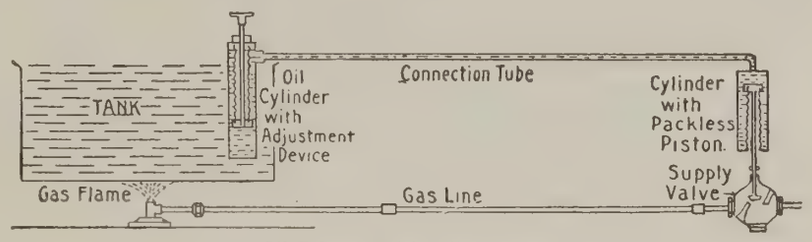
The principal causes of failure, spalling, crushing, and slagging cannot be entirely eliminated, but may be reduced to a minimum by careful attention to manufacturing detail. Almost any shipment of fire-brick will show at least 20 p.ct. defectives on inspection; and, on examination of six loadings of different brands, 60 p.ct. of the defects were attruibtable to moulding, 30 p.ct. to fire cracks, and 10 p.ct. to imperfect setting and irregular shape, all of which could be controlled by inspection and rejection at certain stages of the manufacture. The material should be carefully sorted, and all stock that is soft, or that contained excess of foreign matter, should be rejected. It should be ground as evenly as practicable, to pass a four-mesh screen—any large quantity of finer material being objectionable—and frequent sieve testings should be made. For hand-made brick, the lime should not exceed 2 p.ct., and the water be within 9 to 11 p.ct., the material strongly forced into the mould, thoroughly dried, very carefully kilned and cooled, closely inspected on leaving the kiln, and all defectives rejected. The purchaser should be allowed to inspect or test his consignment before it is loaded.

The Spellerizing Process for Protecting Steel Pipe.—As described in the American "Gas Age," this process is based on the facts that the physical formation and chemical composition of matter are distinct properties. Commercially pure iron is produced in several forms that have much the same composition, but differ considerably in physical properties and durability. Uniformity in composition, density, structure, and surface finish are the most important factors governing corrosion of the pipe. Other causes incidental to structure are the presence of carbon, oxide, or scale, all of which are electro-negative to iron. The actual composition, provided it is not unduly varied in the same piece, is of comparatively slight importance. Spellerizing is a method of treating metal which consists in subjecting the heated bloom to the action of rolls having regularly-shaped projections on the working surfaces, followed by smooth face-rolls while still hot. This is done twice, with a view of producing a dense surface texture, better adapted to resist corrosion, and especially pitting. Being entirely mechanical and independent of skilled labour, efficiency is assured; and even if impurities are present, the prepared surface ensures uniformity of action. If corrosion occurs, it is all over alike. Spellerized steel tube may be safely joined to wrought or cast iron pipe; whereas the same stock, untreated, if so used, shows a decided tendency to corrosion at the juncture.

THE "SARCO" THERMOSTATIC REGULATOR.

This arrangement, which can be adapted for gas, water, or steam valves, and either tank or atmospheric control, is based on the expansion of oil when exposed to heat, which is caused to actuate a spindle attached to a supply-valve. An absolutely tight container is indispensable to satisfactory operation, as the leakage of even a drop of oil would upset the working. The packing for the moveable piston must be absolutely sound under enormous pressure, but also frictionless; and this requirement has been met by the "Sarco" spirally corrugated tube, a section of which is attached hermetically to the outer surface of the piston at one end, and to the inner skirt of the oil cylinder at the other.

The adjustment of the working temperature is effected by a piston fitted with a regulating screw, exposed in the medium to be controlled, and mounted as shown in a length of the spiral tube above described. The lowering of the piston in the oil-cylinder reduces the set temperature; and to increase it the piston is raised. There may be added a relief valve, which will yield in the event of the interior pressure exceeding a safe limit. It consists of a heavy spring interposed between the manually adjustable turn-button and the piston, and lifts when necessary, closing again under normal conditions. The spiral tube is claimed to remain sound under 3000 lbs. per sq. in. pressure.



Oil Cylinder with Adjustment.

THE KEMP COMBUSTION PRODUCTS RADIATOR.

This system patented in the United States, as described in the "Gas Record" [Chicago], is applicable to any system of flow-and-return heating tubes; but a special point is that the return must be smaller than the flow. The novel principle is the circulation of the products of combustion, as shown in the sketch.

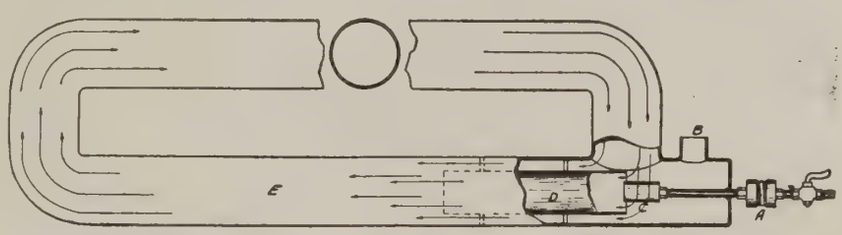


Diagram of the Kemp Combustion Products Radiator.

The tube E is 8 in. diameter, and contains an open inner tube D, placed immediately in front of the burner C, from which a self-sustaining mixture of gas, with the proper proportion of air to ensure complete combustion, is injected under a pressure of 1 lb. per sq. in. The flame is about 8 in. long; and the blast sets up a rapid circulation, as indicated by the arrows. Induced currents enter D at C, and also pass along the exterior. At a point behind the burner, and out of the path of the current, is an outlet B, 2 in. diameter, through which excess products of combustion escape, in proportion to the gases entering at C. The gases travel with great velocity; and the simplicity of the device renders it specially suitable for thermostatic control.

The system has been successfully adapted at Detroit to large japanning ovens for automobile parts. Each side of the chamber, clusters of three 5 in. flow and five 3 in. return pipes extend the whole depth. The excess products, which are neutral and contain no carbon monoxide, pass up the walls to the centre of the top, in a narrow space formed by an inner oven lining, and escape by a circular flue-pipe, at a temperature slightly lower than that obtaining in the oven, which proves a remarkable efficiency.

LARGE INDUSTRIAL APPLICATIONS OF GAS.

Flash Annealing—Foundry Ovens.

Prominent place continues to be given in the "American Gas Engineering Journal" to new applications of gas for technical purposes. A recent issue contained a description of the use of gas for flash annealing large projectiles, by Mr. E. A. Pilnecek, of the Surface Combustion Company.

In course of manufacture, the rough shell is heated to 1650° Fahr. and water quenched, which leaves the metal glass-hard, especially on the outer skin. This must be softened before it can be surfaced; but the body of the metal must not be affected. The softening is accomplished by a rapid surface heating that does not penetrate far—known as flash annealing. After trying every known type of oil or electric furnace, without getting satisfactory results, a large steel works installed two gas-fired flash annealers, which proved efficient in every way. The gas was used at ordinary pressures, with an air-blast from a positive blower; and the quality and quantity of the mixture were controlled by one valve. The furnace is an upright cylinder comprising thick fire-brick walls, backed with insulating material, enclosed in a heavy metal case, mounted on a cast-iron base, and set on a foundation in a shallow pit, to bring the top to a convenient working height.

A larger make of shell was handled later on, and two more gas annealers were installed. In these, the burners were placed radially, but discharged tangentially on the inner walls, thus thoroughly mixing the gases and ensuring uniform temperature in all parts. They were supplied with gas at 10 lbs. pressure, which inspirated the necessary air supply, avoiding air compressors and a second pipe line, controlled by a single valve. A 600 B.Th.U. gas is used; and when starting from the cold the furnace must be raised to 1650° Fahr., which occupies 1½ hours and consumes 1080 c.ft. of gas. A shell is then lowered through a round door on the top by means of a crane, to the centre of the furnace, and remains an average of 10 minutes. By this time the inner walls will have dropped to 1420°, and the skin of the shell will be raised to 900°, with a consumption of 90 c.ft. of gas. After withdrawal, the door is closed and the furnace brought up to the original temperature, using 60 c.ft. of gas and occupying 5 minutes. One furnace will anneal seven shells within 2 hours; a few minutes being lost in handling the charges. The total consumption of gas is 168 c.ft. per shell.

In another article, Mr. Bruno Rahn, Industrial Engineer to the Milwaukee Gas Light Company, is enthusiastic about the successful application of gas for baking foundry cores and moulds. When coal or oil is used, the goods are apt to be injured by unequal heating. If the temperature is excessive, they dry too rapidly on the exterior, are rendered brittle, and likely to fail when the casting is run; if underbaked, they remain too soft. The atmosphere of the foundry is made unwholesome and offensive by the escape of noxious products of incomplete combustion. Gas secures delicate control of temperature, uniform heating, complete combustion, and no air contamination—substantial advantages that ensure its introduction independently of the comparative fuel costs. The ovens are heated by pipe atmospheric burners at the bottom, as in a gas-cooker, and may range in size from a small portable casing that can be carried round from place to place (sometimes a great convenience) to brick chambers, 32 ft. × 10 ft. × 10 ft. high, with sliding doors each end, and a rail track for trolleys, one of which may be loaded with green stuff while the other is in the oven, or with conveying tables in constant motion, in either case securing continuous service. The ovens for small, delicate pieces may be equipped with rotary trays or sliding drawers of the bureau type, and large articles are carried on trucks. Small goods can be baked more rapidly than large, which must dry through slowly; the temperature being 380° to 450° Fahr., according to composition and dimensions.

Solid fuels require ample storage against irregularities in supplies, labour for handling, lighting up, maintenance, and removing ashes; and liquids must have store tanks, compressed air lines, &c. With gas, there is no difficulty in meeting strict official or insurance regulations, as no inflammable material is stored on the premises. The bureau drawer type is popular, because when the drawer is extended the back effectually prevents the escape of products of combustion. An oven 7 ft. × 4 ft. × 4 ft. deep can be maintained at 400° Fahr. on less than 300 c.ft. of gas per hour; and the 30 ft. pipe burners, with air blast and gas under thermostatic control, used in the chamber ovens, consume 1200 to 2000 c. ft. per hour.

The demand is even over the working day, and not influenced by season changes at different periods of the year; so this line of business is particularly attractive at the gas-works. The advantages above indicated, together with economy of labour by avoidance of breakage, increased efficiency, quicker heating up, liberty as to loading arrangements, sanitary advantages, lower cost of first outlay, maintenance and repairs, render it equally so at the foundry.

In the "Baltimore Gas and Electric News," Mr. R. R. Barr describes a method of expanding large cranks weighing 1800 lbs. for ocean-going vessels. The apertures require to be expanded $\frac{1}{16}$ inch in diameter, so as to admit the placing of the axle and crank pin, which is held firmly by the contraction of the metal as it cools. The heat is applied where required by means of a ring burner with air-blast.

GAS DISTRIBUTION AT ATLANTA (GA.).

A description of three distinct systems of distribution on the district supplied by the Atlanta Gas Light Company has recently been published by their Distribution Superintendent, Mr. C. J. Winmeister. It comprises low, medium, and high pressure—all controlled from the gas-works. The original ordinary pressure system still supplies the home districts, and includes cast-iron trunk mains, 30 in. to 12 in. diameter, extended to various parts of the city, and connected to supply mains 8 in. to 4 in. diameter, also a few short runs of 2 in. steel pipe.

Later, some of the trunk mains were isolated, and supplied with gas at 1 lb. per sq. in. pressure (27 in. water-gauge), for the purpose of delivering substantial quantities to outlying districts; and the arrangements admitted of an increase up to 5 lbs. pressure if required. At seven locations, district control pressure regulators were installed in underground chambers; and these delivered gas to low-pressure mains at 3 in. or any desired pressure below the initial. The total length of the low and medium system mains was 239 miles.

The outlying district of Decatur was piped for medium pressure with 6-in. and 4-in. cast-iron pipes, 2-in. steel mains, and 1-in. steel services, and individual house governors with mercury safety seal and vent on the inlet side of each meter. The steel pipe was threaded and joined by means of long line couplings, and intersection street connections were made with Dresser couplings. This installation included twelve miles of piping. It served 450 customers, carried 25-in. water pressure, was put into use over two years ago, and has remained absolutely gas tight. When laid, it was tested under air pressure at 15 to 20 lbs. per sq. in.

The high-pressure system supplied College Park and East Point. It included steel pipe of 4 in. to 2 in. diameter, made in 40 ft. lengths with plain bevelled ends, and joints welded by compressed acetylene and oxygen; and branch lines built of 3 in. and 2 in. similar pipe. The whole was proved under 100 lbs. air pressure, and at present supplied by means of steam driven compressors, at 5 lbs. to 10 lbs. per square inch, which could be increased to 100 lbs. All services were ¾-in., with either welded or special clamp connections on the mains, and a special type of house governor on the inlet of each meter.

Lyon-Spencer Gas Containers.

A great deal of attention is being paid just now—and naturally so, in view of the practically insurmountable obstacles which have been raised to the use of petrol in a general way—to the suitability of coal gas for driving motor vehicles; and information as to its adoption comes to hand from all parts of the country. The vehicles concerned have usually been of the heavier type, arranged with containers on top to take a supply of gas at pressures available—facilities for storage proving something of a problem in connection with pleasure cars, taxi-cabs, &c. There is, however, no doubt that as time goes on an increasing number of smaller cars will be propelled by gas; for suitable equipments are now procurable. Attention has been drawn to a well-made series of containers manufactured by Messrs. Ernest Lyon, Ltd., of No. 91, New Bond Street, W. Of the several types, there is one exceedingly light and well-finished pattern for high-class landaulettes and touring cars; another for delivery vans, large touring cars, &c.; and a third—a special light gas-proof container, made in standard sizes—suitable for all kinds of Ford cars, and capable of running about 25 miles on one charge. The "Lyon-Spencer" installation includes one of the containers, a special carrier to ensure rigidity, and the necessary fittings for conducting the gas to the induction-pipe of the engine. The containers are neatly shaped, and colour-finished to match the car; and it is pointed out that they retain perfect proportion in deflating and lie flat when discharged. In the case of closed cars and commercial vehicles, they are fitted on the roof of the body, and with open cars on a specially constructed canopy running the whole length of the body. Owing to the special shape of the containers, the firm claim a storage capacity of about 10 p.ct. in excess of the circular type.

Midland Association of Gas Engineers and Managers.—The autumn meeting will be held on Thursday, Oct. 11, in the Grand Hotel, Birmingham; and for this occasion the Committee have decided that there shall be no set papers, but that the interests of the members will best be served by informal discussions on technical matters of special concern at the present time. The election of officers takes place at this meeting.

Winter Daylight Saving in Germany.—Now that summer time has come to an end, says "The Times," Germany is organizing new schemes of daylight saving for the winter, in order to economize fuel and artificial light. Notice has been given by the General in command of the Münster Army Corps District that the consumption of gas and electric power in shops, restaurants, and so on must this winter not exceed one-half of the consumption in the winter of 1915-16. All the military and civil authorities, businesses, and other private undertakings are required to alter their office hours, from Oct. 1 onwards, to the time between 8 a.m. and 4 p.m. Schools will keep the same hours. The lighting of shop windows and the use of passenger lifts are forbidden, and all restaurants are to be closed at 9 p.m.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Low Temperature Distillation of Inferior Coals.

SIR,—In reading the interesting article by Mr. T. F. Winmill [*ante*, p. 461] my attention is drawn to the point that the distillation of the coal was carried out under a vacuum of from 26 to 28 inches of mercury.

If the plant mentioned is merely an experimental one erected for academic purposes, this fact may pass. But if the carbonization be carried out in future on a commercial scale, it appears to me that working under such or an approximate vacuum as that mentioned in the article, would involve a collision with the patents held by the "Tarless Fuel Syndicate," which cover the carbonization of coal at low temperatures under vacuum; and I have no doubt that the proprietors of the patents would exert every effort, through the proper legal channels, to uphold their proprietory rights.

As far as using in the retort a "stirrer," or even a continuous screw or helix, it is curious how this idea has fascinated carbonizers—especially of the amateur or patent-seeking type—for almost a generation past; and the records of the Patent Office bear testimony to this.

Quite recently I had, in a foreign country, the opportunity to practically work an installation of this type, erected at some considerable cost, and on quite a substantial scale. It was erected to deal with the easiest of coals to work—viz., a poor lignite, of course non-caking. It failed hopelessly, as it churned the lignite to breeze (some 30 to 40 p.ct.), and failed to produce a reasonable amount of tar oils. The installation is to be displaced in favour of a more modern and perfected system which is now being effected, as the trials of the same lignite sent to this country to be tested by the process indicated proved very successful, yielding:

Petrol	2·2 gallons per ton.
Light oils	4·4 " "
Heavy oils	6·95 " "
Sulphate	22 lbs. "
Good smokeless fuel	12 cwt. "

My experience goes further. With screw-retorts, working rich bituminous coals or cannels, there is the greatest mechanical difficulty in getting the screw to pass such coals or cannels, as when they get to the sticky stage, the power required to operate the screw is enormous.

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W., Sept.* 13, 1917.

Profiteering in Coal.

SIR,—When recently writing to the Ministry of Munitions on their proposed methods for increasing the supply of tar, I pointed out that for some time past there has been a considerable reduction in the make of gas per ton of coal, and in the make of tar and ammonia products throughout the country—due to the abnormal quantities of ash now contained in the coal delivered by the various collieries. The coal is not being picked at the pits mouth, as in pre-war times; and one coal I had under examination which contained 5 p.ct. of ash before the war now contains 13·8 p.ct.

The gas undertakings using this coal are paying for a large quantity of inert material; and so much waste material is carried by the railway companies. This involves labour and money; but it could be readily overcome by the colliery owners having the shale picked from the coal by women at a very small cost per ton.

I think it is quite time all gas undertakings made a combined stand against this imposition that is being thrust upon them. I feel that, so long as they are quiet, they may go on paying for the excess of rubbish now being delivered with their supply of coal.

The Government have guaranteed collieries an increased price for coal; and I am of opinion that it is their duty to protect the purchasers of coal for industrial purposes, and insist on the quality being delivered as before. By this means the Government would materially increase and improve all products obtained by the distillation of coal.

Southport, Sept. 11, 1917. JOHN WEST.

Motors Gas Container Connections.

SIR,—In course of conversation with Mr. Alderman Kay, the Chairman of the Manchester Corporation Gas Committee, I am given to understand that all sizes of connection are being used in conjunction with the gas-bags supplied by various firms. Your readers will readily understand that it is highly desirable that a standard size of fit should be adopted, so that the process of filling can be undertaken at various corporation works with the greatest possible dispatch.

The Manchester Corporation, I understand, would like to see the 2 in. gas size adopted as a standard. I suggest that it would be interesting to invite your readers to discuss the matter through your columns; and I think there would be very little difficulty in coming to a definite agreement on the question at an early date throughout the country, and thus save endless trouble which is undoubtedly in store for owners of these gas-bags, if no arrangement is introduced.

Another suggestion, which it is, to my mind, desirable should be adopted, is that all quotations for the supply of gas for motor-cars should be at "per 100 c.ft."

The Manchester Corporation are, I am informed, prepared to test gas-bags as to capacity, and to give certificates of such tests; and I think that if all corporations who are interesting themselves in the "Gas for Motors" movement would adopt the same method, and accept each other's certificates, and thereby be able to fill gas-bags which had been officially tested, without the necessity of the gas having to go through a meter, considerable time and inconvenience might be saved.

LEO SWAIN,
Chairman, Manchester, Liverpool, and District C.M.U.A.

239, *Deansgate, Manchester, Sept.* 13, 1917.

REGISTER OF PATENTS.

Vaporizing Oils for Enriching Coal Gases and Avoiding Naphthalene Deposition.—No. 108,579.

SWINDIN, N., of Wanstead, Essex.

No. 14,093; Oct. 4, 1916.

This apparatus for vaporizing oils is particularly designed for treating high flash-point oils (paraffin oil) and passing the vapours so formed into a current of coal gas in order to avoid naphthalene deposition.

The invention consists in interposing in a series of main pipes superimposed one above the other and connected by branch pipes at right angles, so that the current of (say) coal gas may pass in succession through the whole series of pipes from the bottom to the top, a large surface of heated films of oil to be vaporized. The films are formed by causing oil to trickle over the surface of a steam-heated pipe having upon it a number of circular gills or (preferably) a continuous fin in the form of a helix. Upon the upper edges of the gills on each gilled pipe rests a long shallow oil-distributing tray having a series of lips, each pair of lips overhanging a gill. Through the walls of each main pipe, immediately above the oil-distributing tray, is fixed an oil-pipe—the uppermost pipe being connected to the oil-supply tank, while the oil-pipes on the lower main pipes are connected to the under side of the next main pipe above, and bent in the form of seals.

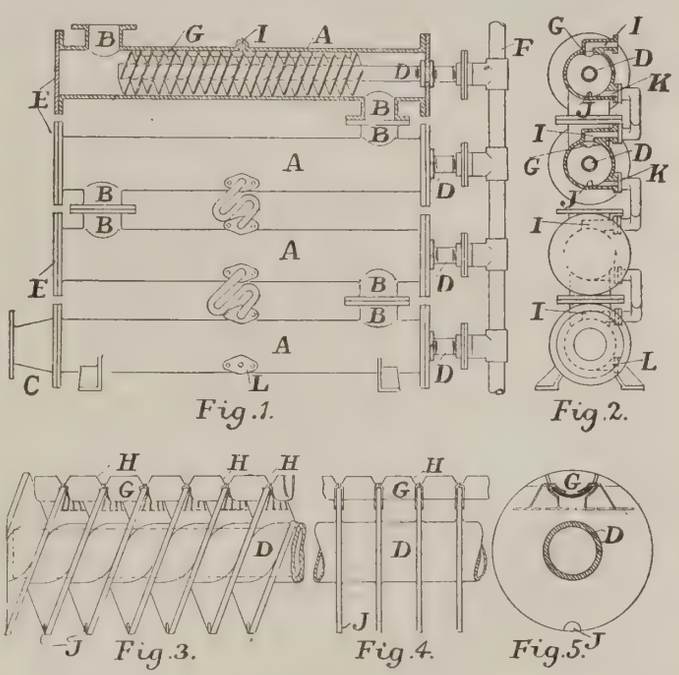
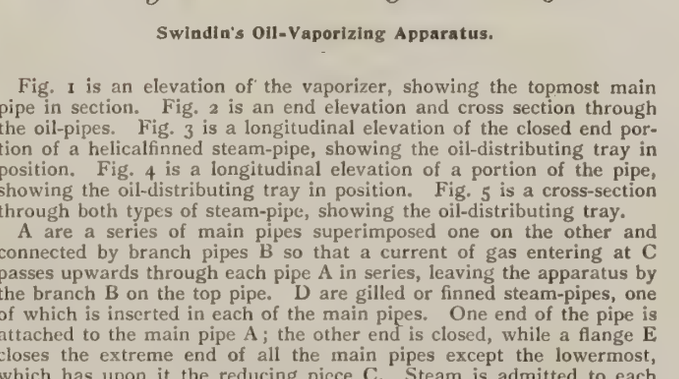


Fig. 1. Fig. 2.



Swindin's Oil-Vaporizing Apparatus.

Fig. 1 is an elevation of the vaporizer, showing the topmost main pipe in section. Fig. 2 is an end elevation and cross section through the oil-pipes. Fig. 3 is a longitudinal elevation of the closed end portion of a helicalfinned steam-pipe, showing the oil-distributing tray in position. Fig. 4 is a longitudinal elevation of a portion of the pipe, showing the oil-distributing tray in position. Fig. 5 is a cross-section through both types of steam-pipe, showing the oil-distributing tray.

A are a series of main pipes superimposed one on the other and connected by branch pipes B so that a current of gas entering at C passes upwards through each pipe A in series, leaving the apparatus by the branch B on the top pipe. D are gilled or finned steam-pipes, one of which is inserted in each of the main pipes. One end of the pipe is attached to the main pipe A; the other end is closed, while a flange E closes the extreme end of all the main pipes except the lowermost, which has upon it the reducing piece C. Steam is admitted to each gilled pipe by a distributing pipe F. Lying in notches formed in the gills of the pipe is the oil-distributing tray G provided with lips H—each pair overhanging a gill or helical fin. By capillarity oil flows out of the tray to the sides of each fin, and is evenly distributed. The oil to be vaporized enters the top main pipe by a branch I, flows into the distributing tray, and overflows by the lips on to the gills of the steam-pipe D. The excess oil collects at the bottom of the main pipe through openings J in the fins, and leaves by a branch K to enter the corresponding branch of the next lower main pipe by a seal pipe. The oil, in like manner, enters and leaves each of the lower main pipes in series till it reaches the lowermost pipe, and leaves by the branch L through a seal pipe.

The apparatus operates as follows for vaporizing oils, for washing out impurities or other bodies from gases, vapours, and the like, or for bringing gases into intimate contact with liquids. The gas is caused to enter the lowermost main pipe at C, and flow upwards through each superimposed main pipe in series and out again to the mains of the works to which the apparatus is connected. When the steam-pipe fig. 3 is fitted, the gas must screw itself so to speak along the main pipes, "which greatly lengthens its travel through the apparatus, which time it is in contact with freshly-formed films of oil." When the circular gilled pipe fig. 4 is fitted the gas passes through a series of staggered openings in the gills—a course which sets up eddy currents and promotes intimate contact of the gas with the films of oil or fluid

on the gills. Steam is admitted by the pipe F to each of the gilled steam-pipes at such a pressure as will maintain a temperature of vaporization of the oil. For paraffin oil, a temperature of 140° Fahr. is found suitable, though lower temperatures may suffice to vaporize a sufficient quantity of paraffin oil.

Gaseous Fuel Furnaces.—No. 108,701.

Ionides, A. C., Jun., of Porchester Terrace, W.

No. 11,374; Aug. 11, 1916.

This invention relates to the utilization of combustible gaseous mixtures, wherein the combustible and supporter of combustion ("gas" and "air") are admixed in self-burning proportions "permitting practically complete combustion without the addition of external air."

In applying this type of combustion to various uses—such as crucible furnaces, or furnaces for billet heating, case hardening, or the like, as in patents Nos. 9568 and 15,322 of 1915 and No. 102,983, using jacketing with the products of combustion and venting of the jackets downwardly—the inventor says he has hitherto found it necessary to use a considerable number of devices supplying the mixture at a number of points into the furnace chamber in order to secure uniform heating and obtain the highest efficiency, which has the disadvantage of involving considerable expense and complication. It is the principal object of this invention to avoid this; and a further object is to secure the uniform maintenance of any desired temperature in the furnace. The invention consists in providing between the main furnace chamber and the nozzles from the mixing devices a combustion chamber into which the nozzles deliver and from which the combustion gases pass through one or more long narrow orifices into the main chamber.

The invention will be dealt with in the paper the patentee intends to read to-morrow (Wednesday) before the Institute of Metals—see next week's "Journal."

Regenerators or Heat Interchangers for Gas Producer Plants.—No. 108,710.

Lymn, A. H., of Tothill Street, Westminster, Riley, L. A., of New York, and Rambush, N. E., of Tothill Street, Westminster.

No. 11,471; Aug. 14, 1916.

The inventors point out that the various kinds of regenerators or heat interchangers used in connection with gas producing plants have the disadvantage that a large amount of dust, dirt, and carbonaceous matter is deposited into a solid cake on the tube serving as the heat interchanger—a deposit which causes the heat interchange through the metal walls to diminish very rapidly, so that "after a short time it becomes ineffective and the whole plant has to be stopped in order to clean the surfaces of the tubes."

The present invention aims at overcoming these defects by forming the heat interchanger of a plurality of concentrically arranged chambers (preferably cylinders), which are arranged in such way that hot gases from the producer are caused to traverse it in serial order. Intermediate with, or both intermediate with and surrounding, the chambers are arranged parallel flow conduits for the air and steam passing to the producer in such way that it is caused to traverse the chambers and/or tubes preferably in the opposite direction to that taken by the heating medium—a plurality of connecting pieces being provided between the spaces traversed by the medium to be heated. Means are also provided for enabling the surfaces of the regenerator to be cleaned, and for collecting the dust and carbon particles while the apparatus is in operation.

Indicating the Volumetric Flow of Gases. No. 108,711.

Werner, E. E., of St. Louis, Missouri, U.S.A.

No. 11,473; Aug. 14, 1916.

This invention relates to an improved form of the type of apparatus in which a varying air or gas pressure is gauged by a discharge from it into a liquid-holding receptacle into which the air or gas passes through a tube or cylinder having perforations in it so positioned that, as the pressure rises and falls, the openings are more or less uncovered by the liquid within it, and in which the air or gas escapes through the holes and rises in bubbles (of greater or less number) visible, so that an attendant seeing them can ascertain or read the pressure.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 12.]

Nos. 12,596—12,921.

Best, E. A.—"Gas-lighter." No. 12,659.

Craig, W. F.—"Gas-lighters, &c." No. 12,872.

Fleetwood, J.—"Incandescent gas-mantles." No. 12,694.

Goodall, Clayton, & Co.—"Manufacture of coal gas." No. 12,834.

Gundry, P. G.—"Liquid-flow meters." No. 12,617.

Harrison, W.—"Manufacture of gas-tight membranes and fabrics." No. 12,598.

Hodge, G. H.—"Bakers' oven heated by gas under pressure." No. 12,821.

Merriman, H. O.—See Gundry. No. 12,617.

Murphy, S. J.—"Water-gas producers." No. 12,677.

Ottino, G. P.—"Storing coal gas, &c., for use in motor-vehicles." No. 12,722.

Settle, T.—See Goodall, Clayton, & Co. No. 12,834.

Stockdale, W.—See Hodge. No. 12,821.

Taylor, W.—"Apparatus for condensing and retaining compressed or liquefied gas in a receiver, for use with motor-vehicles, &c." No. 12,820.

Taylor, W. M.—"Gas-fired water-heaters or steam generators." No. 12,850.

MISCELLANEOUS NEWS.

EMPLOYMENT OF WOMEN IN GAS-WORKS.

Official Information as to Substitution for Enlisted Men.

In the latter part of last year, there were issued by the Home Office and the Board of Trade a series of pamphlets dealing with the substitution of women in industry for enlisted men; the object being to make available for manufacturers all over the country the fullest information as to the processes in which, and the methods by which, such temporary substitution is already being carried out. The series includes 27 industries; and Pamphlet No. 22 relates to gas-works. The information given in the first edition of this was reproduced in the "Journal" for Oct. 10, 1916 [p. 90]; but at the close of the year, careful inquiries were made to ascertain what further developments had taken place in the substitution of women—the new information thus obtained necessitating the issue of a second edition of the pamphlets. A copy of this new edition has been officially forwarded to us, and to bring the matter up to date is reproduced below.

I.—Processes in which Women can be Substituted for Men.

Before the war, women were not employed in this industry, except perhaps in the case of a few small works. The processes and the machinery employed are of a more complicated character in large than in small gas-works, and the weight of material to be handled much greater.

In view of the wide variations in plant and methods of manufacture to be found in different gas-works, it is not suggested that women can or ought to be employed in all such works in the processes named below. The circumstances of each case require separate consideration. It may, however, be said that even now many managers of gas-works do not fully realize how large a part of the work on which until recently only men were employed can be, and is being, done efficiently by women substitutes.

In a considerable number of instances, operations are being made easier for women workers by the provision of lighter tools, barrows, &c., and by the introduction of machinery enabling them to deal with heavy weights. Where women are pronounced unsatisfactory as substitutes, it is almost invariably found that no attempt has been made to provide either suitable tools and labour-saving appliances, or protective clothing and other necessary comforts.

Besides the occupations enumerated in the list below, women are now employed in large numbers in the offices of gas-works, both in work purely clerical and in semi-technical work as rental clerks. They are being increasingly substituted for men in the following auxiliary occupations: Reading and inspecting meters, collection of accounts, and collection of pence from slot-meters. A beginning has been made in their employment in the department of stove and meter repairing on customers' premises.

Women are now successfully replacing men in the following processes in and about gas-works. [Where women are employed only as assistants, the name of the process is followed by the letter A.; P. (for partial) indicates that there has been subdivision or re-arrangement of the process to facilitate substitution. In other cases complete substitution has been effected. Notes as to labour-saving appliances or other points of interest are added in italics.] Processes not included in the list are those in which inquiry has not at present discovered cases of successful substitution:

Coal Department (Coal Porters).

Breakers, elevators, conveyors. Attending. P. *Men usually do repairs.*
Stacking and unstacking. P. *Lighter lumps only handled, in two throws instead of three. Strong type of woman necessary.*
Weighing.

Retort-Houses.

Coke quenching, clearing up, pan mucking. P. *Very strong women required.*
* Cleaning mouthpieces and augering pipes. Charging and discharging—by machine. Trimming, firing, poking-in, door shutting, coke spreading. P. *Very strong, carefully selected women required.*
Machine stoking.

Purifiers.

Filling and emptying boxes or vessels. P. *Lighter barrows.*
Mixing, screening, and turning oxide, loading into barrows. P. *Lighter barrows. Breaking up by machine instead of by hand in some cases.*
Slaking lime.

Coke and Breeze (Coke Porters' Work).

Breaking, washing, screening, riddling, picking, reclaiming. P. *Strong type of woman required.*
Crushing. *Machine introduced in some works to replace hand crushing.*
Filling carts and barrows. P. *Only very strong women are suitable for cart-filling.*
Filling sacks from hoppers or heaps (bagging); weighing; carrying. *The use of ½-cwt. bags facilitates the employment of women in these processes.*
Sorting clinker.
Wheeling in barrows. *The use of ½-cwt. bags facilitates the employment o women in this process.*

Engine (Stationary) and Exhauster.

Cleaning and oiling. P.

Maintenance (Repairs).

Bricklaying. P.
Bricklayers' and retort-setters' mates' work. P. *Hods are replaced b baskets and lifting tackle.*
Joining and woodworking machining. P. *On suitable selected work.*
Turning, fitting, and machining (metal). P. *On suitable selected work.*

Yard Work.

Cleaning yard, floors, and windows.
Crane driving.
Gasholder and other scraping, painting, and tarring. P. *Improved cradles are introduced to increase sense of security. Annular pits are fenced.*
Sack repairing, cleaning retort-mouthpieces in yard, cleaning vehicles.

* Suitable only in certain works.

Ammonium Sulphate.

Bagging.
Centrifugals. Attending.
Still assistants' work. P.

Gas-Stove Repairing.

P. *On the lighter class of stove.*

Meter Repairing.

P. *On the smaller meters.*

Timekeeping.

P. A.

Laboratory Work (Chemical and Physical).

Photometer work. P.
Research work. P.
Routine testing. P.

Delivery.

Carmen's work and carting. P.
Motor driving.

II.—Supply of Women Workers.

Special arrangements have been made by the Government for recruiting women workers to take the place of enlisted men. Employers should apply without delay to the local Employment Exchange, where they will be given every assistance in obtaining the workers they require. In some cases, owing to the special need for women of strong physique, it may be necessary to bring women from other districts; and the fullest possible information should be given by employers in order to secure the right type of women workers. It is not anticipated that there will be any difficulty in securing such workers, if suitable arrangements are made and adequate remuneration offered.

III.—Relaxation of Factory Acts.

Where the continuous nature of the process or exceptional pressure of work justifies an application for relaxation of the Factory Acts, the Home Office is prepared to consider the special circumstances of each case. Full information as to the mode of application for relaxations can be obtained from the District Inspectors of Factories.

IV.—Arrangements in Factories.

As much of the work to be done is dusty, dirty, wet, and involves exposure to weather, it is important that special clothing, to be kept at the works, be supplied to all women employed in the yard or buildings. Those working in the open air or on wet processes should have waterproofed garments or oilskins and clogs. In retort-houses and other departments where excessive heat has to be encountered, thick woollen clothing is necessary. Wherever climbing is involved, a trouser suit is required; and on account of the dirty nature of the work, head-coverings are needed. The best clothes for outdoor labouring work are trousers and a tunic reaching to the knee, with a cap and clogs. The suit should be cut so as to permit of the wearing of a considerable amount of underclothing, to which the type of woman employed in gas-works is accustomed.

The constant contact of the workers with dirt and dust calls for the provision of suitable changing rooms, with baths (hot and cold water), as well as ordinary lavatory basins with towels and soap.

Mess-room accommodation and facilities for making tea or other hot drinks are much needed, and have in many cases already been provided by the companies who have substituted women for men.

As a few of the processes are solitary, and the nature of the work calls for the supervision of the health of the women by a woman, the presence of a forewoman or lady superintendent in the works is particularly desirable in this industry.

The District Inspectors and Lady Inspectors of Factories are ready to advise and assist employers in regard to health and safety or other points which may arise in connection with the introduction of women. The assistance of Employment Exchange Officers and the Local Advisory Committees (where any have been appointed) may be invoked in case of special difficulties as regards lodging and transit of imported workers and other local welfare problems.

PIT PRICES FOR COAL.

Instructions of the Controller of Coal Mines.

Last Tuesday there was issued from the Coal Mines Department of the Board of Trade the following letter, signed by Mr. Guy Calthrop.

Board of Trade—Coal Mines Department,
8, *Richmond Terrace, Whitehall, Sept.* 6, 1917.

COAL PRICES.

Gentlemen,—In view of the considerable diversions of coal which will take place under the operation of the "Coal Transport Reorganization Scheme," I think it necessary to issue definite instructions to the collieries in regard to certain questions as to prices which have from time to time been the subject of disputes between sellers and purchasers.

I do not suggest that any charge of profiteering can with reason be made against the great body of coal owners in the Kingdom. Complaints have, doubtless, been made that the prices authorized by the Price of Coal (Limitation) Act have been exceeded in certain cases; and, from inquiries which have been made, I think there is some foundation for this complaint. But where the excess complained of is small, I think it is very probable that the difference between the coal owner and the purchaser arises from the different constructions which have *bonâ-fide* been placed upon the provisions of the Act.

There are cases, however, which this explanation does not justify, and where the amount charged is in excess of what, upon any construction of the Act, can be justified. Where such cases have been brought before me, I have dealt with them; and I am prepared to deal with any cases of such a kind which may be submitted to me in the future. But I feel that it is also necessary that the whole position in regard to colliery prices should be clearly defined, with a view to avoiding disputes in future.

I do not propose to issue any official interpretation of clauses in the Act; but I feel that you will appreciate that I must take every means in my power to prevent any justification for a charge of profiteering in the coal trade whilst under my control. Accordingly, although the number of cases in which there is any material ground for complaint may not be large, I have decided—after consultation with the Chairmen of the Coal Owners' Associations and of the District Coal and Coke Supplies Committees—that, as the introduction of the "Coal Transport Reorganization Scheme" involves the cancelling of numerous contracts, all existing contracts for the sale of coal for inland consumption shall be abrogated as from the 10th of September, and in the re-arrangement of prices, the instructions which accompany this letter shall be carried out.

As I have said above, these instructions are not to be taken as official determinations of any provisions in the Price of Coal (Limitation) Act, but as instructions to the coal owners, who are, in effect, selling fuel on behalf of the Controller of Coal Mines.

The general abrogation of contracts, apart from the effect of the "Coal Transport Reorganization Scheme," is provided for by Article 2 of the Wholesale Coal Prices Order, 1917. It will be observed that it is specially provided that there shall be no interruption of deliveries; and I think that by this arrangement it will be possible to give effect to the review of prices with the minimum of inconvenience to the coal industry and to the business of the country generally.—Yours faithfully,

GUY CALTHROP.

[ENCLOSURE.]

Pit Price of Coal for Consumption in the United Kingdom.

INSTRUCTIONS OF THE CONTROLLER OF COAL MINES.

Dated the 6th of September, 1917.

1. An instruction has already been issued to collieries prohibiting the sale of coal for consumption in the United Kingdom, except at the maximum prices under the Price of Coal (Limitation) Act—Part 1 of the directions of June 28.

2. This instruction does not mean that the highest price which a colliery company obtained for a particular description of coal in the year ended June 30, 1914, is to form the basis for all future sales of the same description of coal; but merely that the price at which any sale is hereafter made shall exceed by the standard amount under the Price of Coal (Limitation) Act the price under a corresponding sale made on the corresponding date (or as near thereto as, having regard to the course of business, may be practicable) in the year ended June 30, 1914. In the case of sales under contract, comparison is to be made with a similar contract made on the corresponding date (or as near thereto as, having regard to the course of business, may be practicable) in the year ended June 30, 1914, not with a contract made before July 1, 1913, for delivery during the year ended June 30, 1914.

3. While it is not necessary in determining the corresponding price under the Price of Coal (Limitation) Act that in every case comparison should be made with sales to the same buyer, still it is clear that similarity of description, quantities, and conditions would more likely be found in the contract with the same buyer for a similar purpose and approximately on the same date in the corresponding period.

4. Where a buyer is asked to pay a price based, not on his own purchase at the corresponding time in the year ended June 30, 1914, but on a sale to another buyer, he may request to be furnished with such particulars of this sale (date, quantity, description of coal, and pit price) as will enable him to ascertain that it corresponds with the sale to himself.

5. No colliery shall: (*a*) Refuse to renew a contract for the purpose of obtaining a better price elsewhere. (*b*) Alter the conditions of supply (*e.g.*, free coal instead of contract) for the purpose of obtaining a higher price.

6. Where coal is diverted from one district to another, the price chargeable to the new customer is to be based on the prices which the supplying colliery is entitled to charge for the same description of coal in the new district—these being determined by reference to corresponding sales in that district on the corresponding date, or as near thereto as, having regard to the course of business, may be practicable, during the twelve months ended June 30, 1914, in accordance with the Price of Coal (Limitation) Act and these instructions.

7. Prices of washed fuel for inland consumption are to be regarded as subject to limitation, as in the case of prices of coal prepared by other processes, such as screening, picking, breaking, &c.

(*a*) Where the coal is washed by the colliery producing it, the price is to be the corresponding price in the year ended June 30, 1914, with the addition of the standard amount applicable to the colliery under the Price of Coal (Limitation) Act.

(*b*) If there is no such basis at the colliery, reference must be made to prices charged by other collieries in the district for similar fuel in the year ended June 30, 1914.

(*c*) In cases to which neither of the above methods can be applied (*e.g.*, where unwashed coal is conveyed to a washery from collieries under different ownership at a distance), the prices at the washery must not exceed those corresponding to the legal price of the unwashed coal at the pit's mouth, together with the actual cost of transport and reasonable charges for washing—such charges to include loss of weight in washing, cost of washing operations, and reasonable profit thereon.

8. The fact that a purchaser has offered to pay a price in excess of that authorized by the Price of Coal (Limitation) Act is no excuse for an infringement of the Act or of these instructions.

GUY CALTHROP,
Controller of Coal Mines.

Board of Trade—Coal Mines Department,
8, *Richmond Terrace, Whitehall.*

The Walsall Corporation Gas Committee propose to spend £254 on plant required to give a supply of gas to Corporation buses.

RETAIL PRICES OF HOUSE COAL.

Further Instructions of the Controller of Mines.

Under the Retail Coal Prices Order, 1917, which has been made by the Board of Trade at the instance of the Controller of Coal Mines, maximum retail prices of house coal throughout the United Kingdom are now to be definitely fixed. In view of the wide differences in the cost of coal in different localities, due mainly to transport charges, but partly also to differences in the maximum colliery prices and in local merchants' costs of distribution, the duty of fixing the maximum retail prices in each locality has, by arrangement with the Local Government Board, the Scottish Office, and the Irish Office, been assigned to the local authorities.

The basis on which the maximum prices are to be arranged by the local authorities is contained in the Order, Article 1 of which provides that the net profit from sales of coal delivered by road vehicle from a depôt or wharf or railway siding in lots of one ton or over shall not exceed 1s. per ton. This net profit includes all interest charges and salaries to owners, partners, and directors of the business, but not remuneration to owners of small businesses in respect of manual labour or clerical work performed by them. The local authorities are to meet the local coal merchants, and, after investigation of the figures submitted by them, are to publish in the local Press lists showing the prices chargeable under the Order for the various classes of coal sold in the district for household purposes.

In order to save the local authorities the trouble of investigations into costs in every locality, a detailed memorandum has been forwarded to each local authority embodying the results of a careful examination made by the Controller of Coal Mines of the position in a large number of localities in different parts of the country. As a result of this examination, it has been ascertained that in general (except in the case of sea-borne coal) retail prices should not exceed the prices in operation in the twelve months prior to the war by more than 6s. 6d. to 7s. 6d. per ton; the lower of these figures applying more particularly to towns in the neighbourhood of collieries. In certain cases, however, the increases over pre-war prices are less than these amounts; and in such cases there should be no increase in the present prices. On the other hand, in other districts an increase of more than 7s. 6d. per ton over pre-war prices may, owing to special circumstances, be justifiable. The local authorities have been informed that if the prices submitted to them by the merchants do not exceed the pre-war prices by more than the above amounts, they may be regarded as complying with the Order and may at once be published as the maximum prices for the district. If, however, the proposed increase over pre-war prices exceeds the appropriate amount mentioned above, the local authority are to request the merchants to furnish particulars of the increases in costs in order that the reasonableness of the prices which they suggest may be verified.

The provisions of the Order with regard to the fixing of prices do not apply to such parts of the areas of local authorities in the Metropolitan Police District and adjoining areas as are for the time being subject to the provisions of the Household Coal Distribution Order, 1917.

SHEFFIELD CORPORATION AND THE GAS COMPANY.

The report of the Directors of the Sheffield United Gas Light Company appointed by the Sheffield Corporation, for the year ended Aug. 31 last, states that the past year has been one of great difficulty and anxiety to the management of the Company. While the demand for gas for all purposes has been great and increasing, shortage of labour and the demands of the Ministry of Munitions have caused the supply to be maintained only with the greatest possible amount of extra work on the part of the staff generally; but the quality has depreciated and given rise to many complaints—as to the lighting, heat, and power of the gas produced. Naphthalene troubles have also been frequent. The whole of these complaints are due to the abstraction of essential ingredients which have been demanded by the Ministry of Munitions under the Defence of the Realm Act, rendering it impossible for the management to produce the quality which has been for many years equal to the usual standard required.

During the year the Company made an application to the Board of Trade to fix a calorific instead of a lighting standard; and though the application was opposed by the Corporation, the Order was granted. Details of it have already been placed before the Corporation.

In consequence of the increasing demand for gas for furnaces and power, the Company, late in last year, found it necessary to apply to Parliament for further capital and other powers. This was not contemplated by the Company when the last report was made. The Corporation lodged a petition against the Bill generally; and though the Company made the offer of several concessions (among others, a reduction of the amount of capital applied for) at conferences with the Corporation, no agreement was arrived at, and the Corporation opposed the Bill in Parliament. The result was that the whole of the capital powers were granted, and, with the exception that the sinking fund clauses (which the Company had been willing to withdraw) were struck out and coke-oven gas was not to be used for lighting purposes, the Company practically got all they asked for. No site for the proposed new works was able to be given; but this has since been obtained. A clause protecting the Corporation with regard to the opening of streets was settled by agreement, and inserted in the Act. The gas sold during 1916 shows an increase of 394,524,000 c.ft., or 7·97 p.ct., over 1915, although the receipts for public lighting were only £1988, as compared with £9001 in 1913, when the price was lower. The average price at which gas was sold during 1916 was 1s. 6·79d., as compared with 1s. 4·25d. in 1915, before the price was raised 6d. per 1000 c.ft.

During the year, many additions have been made to the plant, with a view of economizing labour and for the better production of gas; but on many occasions retorts have been standing idle in consequence of shortage of labour.

Substantial increases of wages have been made during the year.

The Company have no intention of making any parliamentary applications during the coming year, beyond the necessary application to the Board of Trade for a Provisional Order to manufacture gas on the new site (which is outside the City boundaries) and which was contemplated, and stated when the new Act was applied for.

In connection with this application, the Company may propose some modification of clause 36 of the Act (with regard to coke-oven gas), but will place their proposals before the Corporation at an early date.

SOUTH SUBURBAN GAS COMPANY'S PROTECTION CERTIFICATES WITHDRAWN.

Employers' and employees' applications were before the Lewisham Tribunal yesterday week, in regard to three members of the South Suburban Gas Company's staff—C. Ashley (31), ledger clerk; R. J. Fowler (29), ledger clerk; and W. J. R. Cooper (27), chief wages clerk. The cases had not previously been considered by the Tribunal; applications which should have come up on May 30 last having been withdrawn on the grant of protection certificates by the Munitions Area Recruiting Officer. All three men were rejected on offering themselves for service in November, 1915. Notwithstanding this, they were passed Class A by a travelling medical board which sat at Lewisham Town Hall on April 24 last.

The applications were on the ground that the men are engaged in work of national importance; the men also claimed on medical grounds. Mr. Wilfred Wastell, the Secretary of the Company, said these were the only three left on the staff who were Class A; and the Company felt that they were improperly classified. The Chairman (Mr. F. Mead) remarked that, the protection having been withdrawn, the Tribunal had to consider the claims on their merits, quite apart from the protected occupations scheme. Mr. S. E. Cockerton recalled that when the Company's cases were before the Tribunal he protested against the methods of the military. Men who had been granted exemption by the Tribunal were brought before them because they had these certificates, and the Tribunal withdrew the exemptions. It was a new dodge by the military authorities to get men into the army against the opinion of the Tribunal. The applicants produced certificates of private practitioners to the effect that they were unfit for military service. The Chairman said the Tribunal did not need to discuss whether exemption was necessary in the Company's interest until they knew the state of health of the men.

Consideration of the cases was adjourned, in order that the applicants might go before the Whitehall Medical Board.

A SHORT-LIVED STRIKE AT DONCASTER.

At Doncaster, the week before last, 269 men (members of the National Amalgamated Union of Labour, employed in several departments of the Corporation) handed in notices to cease work, demanding an advance in wages of 1s. a day. At a subsequent meeting of the Town Council, a Special Committee who had considered the demand recommended the Council to protest against the action of the Union in communicating with the Chief Industrial Commissioner before the Council had had an opportunity of fully considering the application. The Committee also recommended that no further advance be entertained at present, except in the case of the women labourers at the gas-works, who should have an increase of 2s. a week.

Negotiations were entered into; and it was understood that the notices would be suspended pending arbitration proceedings before the Committee on Production. It transpired, however, that the Special Committee had accepted some of the notices of the men employed in the highways and other departments; and on this becoming known, the men engaged at the gas-works decided to come out in sympathy. This they promptly did; but the gas supply was maintained by volunteers among the townspeople until the following day, when the strike was settled—the Corporation deciding that all the men out should be allowed to return to their work.

Complaints of Gas Pressure at Hammersmith.—Reporting to the Hammersmith Borough Council, the General Purposes Committee state that their attention has been directed to a number of complaints by residents in the borough of the low pressure of the gas supplied by the Brentford Gas Company. The Committee appreciate the restrictions and difficulties with which the gas undertaking is beset, but consider that the complaints should receive proper attention. They have accordingly made representations to the Gas Company which, it is hoped, will result in some improvement being effected in the pressure of the gas.

Shrewsbury Gas Company's Meeting.—A further small decrease in the consumption of gas was reported at the annual meeting of the Shrewsbury Gas Company, when a dividend making 5 p.ct. for the year was declared. The profit on the year's working amounted to £5267. The resignation was intimated with regret of Mr. T. F. Poole, who had been a Director for upwards of 25 years, and Chairman since 1909. Mr. J. B. Lloyd, who presided, said coal had cost £6014 more than in the year ended June, 1914, and wages £2392 more. The total expenditure was £12,863 more, though the quantity of gas made was the same. On the other hand, receipts were £10,738 more; and the difference of £2125 had to be made up. It was therefore necessary to increase the price of gas, for which an additional 2d. per 1000 c.ft. would be charged. This would also affect the proprietors by reducing the dividend from 5 to 4½ p.ct. Replying to a vote of thanks, Mr. William Belton (Engineer and Secretary) remarked that, though times had been very difficult, he was afraid they would be more difficult yet.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Report.

The report of the Directors for the half year ended June 30 last states that the accounts show a profit on the revenue account of £41,435; and, after providing for interest on debenture stock and temporary loans, there remains the sum of £32,851, to which must be added the sum of £2502, credit from income-tax account, making a total of £35,353.

The Directors recommend the declaration of the maximum statutory dividend on the consolidated ordinary stock of the Company, which, owing to the increase of 6d. per 1000 c.ft. in the price of gas, has been reduced to the rate of 4⅜ p.ct. per annum, less income-tax. This will absorb the sum of £33,947, after which a balance of £1405 will remain to be carried to the next account. The costs of coal, oil, freight, and all materials continue to show abnormal advances over pre-war times; but the Directors feel confident that the shareholders will be gratified at the substantial increase in the quantity of gas sold and the results of the half-year's working.

The statement of gas made indicates 813,485,000 c.ft., including 253,366,000 c.ft. of carburetted water gas. The total quantity of gas sold was 705,911,000 c.ft.—public lighting, 18,327,000 c.ft., and private lights per meter, 687,584,000 c.ft. The quantity used at the works was 18,091,000 c.ft.; the quantity accounted for being 724,002,000 c.ft., and that unaccounted for 89,483,000 c.ft. The number of public lights was 4734. In the matter of residual products, it is estimated that there were in store on Dec. 31 last 1612 tons of coke, 178 tons of breeze, 171,989 gallons of tar, and 75,399 gallons of ammoniacal liquor. During the half year the quantities made were: Coke, 30,284 tons; breeze, 7152 tons; tar, 482,960 gallons; and ammoniacal liquor, 904,656 gallons. There were used in manufacture in the half year 12,619 tons of coke, 3856 tons of breeze, and 687,101 gallons of ammoniacal liquor. The quantities sold in the half year were: Coke, 18,380 tons; breeze, 2996 tons; tar, 535,869 gallons; and ammoniacal liquor, 108,025 gallons—which latter, it is noted, was lost through the bursting of a tank. In store at the end of the half year were, as estimated: Coke, 897 tons; breeze, 478 tons; tar, 119,080 gallons; ammoniacal liquor, 184,929 gallons.

The Company are now urging, as a new industry worthy of attention in Ireland, the system of fruit and vegetable drying by means of gas; and a pamphlet on the subject has been in large demand from the new distribution department in Hawkins Street. This department, with its spacious demonstration hall, has fast become a centre of great attraction to all classes of customers and to visitors from the provinces.

LEA BRIDGE DISTRICT GAS COMPANY.

New Vertical Retort Installation in Satisfactory Operation.

The Half-Yearly Meeting of the Company was held on Tuesday last, at the Offices, Nos. 63 and 64, Chancery Lane, W.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Richard Sandell) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN said he did not think that careful perusal would reveal anything to materially qualify the very satisfactory character of the statement presented. There had been in the six months ended June 30 an increase of nearly 17 p.ct. in the quantity of gas sold, as compared with the corresponding period of 1916; and since the accounts were prepared, this increase had continued in an even greater degree. As to the accounts, it would be seen that the capital stock remaining to be issued for the purposes of this rapidly growing business amounted to only £8710; but the Directors had anticipated matters in this regard by obtaining an Act during the current session, by which they had power to issue £200,000 more. In the same way, the debenture stock remaining to be issued (£17,624) was increased by £66,000. In addition, the amount authorized to be issued as debenture stock under the old Acts had been increased by £20,000. Thus there was an addition of £300,000 to their capital powers by virtue of the new Act. This was very satisfactory, inasmuch as the Act was secured by treaty, and did not involve them in the expenses of opposition. The capital expended per million c.ft. of gas sold was now £528, which, considering the size of the undertaking, was a very good figure indeed. They had during recent years gained ground steadily in this direction. Only £2476 had been spent on capital account during the past six months; and there had been written-off as depreciation £3658. Coming to the revenue account, there was an important increase in the sum paid for coal—amounting to nearly £8000; but, of course, the greater quantity of gas made had a good deal to do with this. Really, the cost of the coal was about 50 p.ct. in excess of what the Company paid before the war. Oil, which they used as sparingly as possible, had increased by over 200 p.ct., which was putting it at a very moderate figure indeed. Maintenance charges had been well kept up. Their carbonizing wages worked out at 1·94d. per 1000 c.ft., which was an uncommonly good figure. In comparing figures of this kind, it had to be remembered that some of them were favourable as wages, simply because bonuses to a disproportionate extent had not been brought into the account. Some companies had increased their wages and paid a bonus; and others had paid bonuses and left the wages alone. In their own case, they had very materially increased the wages of their men. Law charges £1059 had been incurred mainly in connection with their new Act. The war bonus on wages for increased cost of living, without considering the increase in wages to which he had referred, came to more than 1d. per 1000 c.ft. They were selling gas at 3s. 3d. per 1000 c.ft.; and, so far as could be seen, there was every reason to anticipate that this figure would not be increased, at all events before the next meeting. Gas and meter rental had brought in just over £9000 more; the total receipts being £13,383 up. Against this, the expenditure was £11,305 more; the profit thus being larger by about £2000. There had been brought into the profit and loss account £5629; and they were carrying forward to next account £6767. After paying the dividend, which had been maintained at the highest rate that they had paid, they had increased the carry-forward by £1138. They began the present six months with what constituted a very good start; and he did not think there was any particular danger to be pointed out as threatening them. What success had been achieved was the more meritorious, because they had had a newly-constructed works to deal with. The installation of Glover-West vertical retorts was in perfectly satisfactory operation. The results were quite commensurate with what was anticipated; and the facilities offered with regard to labour saving were also satisfactory. These new appliances and new methods brought with them changes in reference to manufacture which needed careful noting, and required some adaptation to the peculiarities of existing practice.

LOW-TEMPERATURE CARBONIZATION.

He sometimes thought in these days that the education in carbonization had not been very good in the past of some of those who advised them rather hurriedly in the matter of changes. He had been very much struck with the suggestion thrown out broadcast that they might with advantage hurriedly transpose the system of carbonization with high heats and high yields to one of low temperature. This bespoke the untrained or the insufficiently trained mind; and to him, from the very beginning, the whole thing seemed replete with danger. The one thing they dreaded in the old days was being forced back to low temperature against their will. Sometimes they had had to make large volumes of gas at very short notice, and it had been necessary to alter the six-hour charges then prevalent to four-hour ones, getting the extra gas by thus rapidly filling and emptying the retorts. A more wasteful, mischievous, deleterious way of working could not be conceived. It meant the absolute ruin of their works economy. He was therefore astonished when he saw it hastily advocated as an expedient to meet current difficulties of the day. There was only one thing to be said of it—that it was rather more hurriedly withdrawn than it was put forward. This was the most decent sort of apology that could be made for the proposal. Had the advocates of low-temperature carbonization realized what the effect was going to be on the coke? The coke that was made in this way would be almost impossible to transport, because of its friable character, and the loss whenever it was touched. This loss was quite enough nowadays when one had to deal with Yorkshire coals. He could not help thinking that whoever was responsible for the proposal could not have seen much of the inside of a retort-house. The Company had their own technical problems; but they had very good technical officers to grapple with them, and a Board which, if it had no other merits, would not lightly adopt ill-timed and ill-considered proposals. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion, which was unanimously agreed to.

Proposed by the CHAIRMAN, seconded by Mr. A. F. PHILLIPS, dividends were declared, less income-tax, at the rates per annum of 5 p.ct. on the preference stock and 6½ p.ct. on the ordinary stock.

The meeting concluded with a hearty vote of thanks to the Chairman, Directors, Engineer and Manager (Mr. F. W. Cross), the Secretary, and other officers, which was acknowledged by the CHAIRMAN.

ILFORD GAS COMPANY.

Moving the adoption of the report and accounts for the half year ended June 30, at the meeting of the Ilford Gas Company, the Chairman (Mr. William Ashmole) said the sale of gas for the six months showed an increase of 2·75 p.ct. on the quantity sold during the corresponding period of 1916. After providing for the interest charges and writing-off certain obsolete plant, the balance of the profit and loss account available for dividend was £21,057, out of which sum the Directors recommended a dividend for the half year at the rate of 7 p.ct. per annum on the "A" and "C" stocks, and 5¼ p.ct. per annum on the "B" stock, subject to the deduction of income-tax. These payments would leave a balance of £14,663 to be carried forward. In consequence of a further rise of approximately 50 p.ct. in the cost of gas oil, and of another considerable increase of the war bonus paid to the employees, the Directors had been compelled to increase the price of gas to 3s. 5d. per 1000 c.ft. from Midsummer last. This increase in the price of gas, while regretted by the Board, was quite unavoidable. The war bonus paid by the Company, together with the war allowance to employees serving with the Forces, represented almost 3d. per 1000 c.ft. The analysis of coal and oil, including dues, carriage, unloading, &c., showed that the cost of gas per 1000 c.ft. equalled 2s. 2·70d., against June of 1914, when the same items represented 1s. 6·65d., an increase of over 8d. per 1000 c.ft., which, added to the 3d. above referred to, made a total of 11d. per 1000 c.ft., exclusive of the extra cost of all other materials. Receipts had also increased, but not in the same proportion. The total receipts per 1000 c.ft. of gas sold for this half year equalled 4s. 5·96d.; whereas in June, 1914, they were 3s. 8·06d.—giving an increase of 9·9d. They had not yet reached top figures in this balance-sheet for labour, material, and other outgoing expenses, several of which items had only been at their present high figure for part of the period under review. Conditions had not improved since last they met. If anything, they had become more serious, particularly with regard to the supply of material and the difficulty of securing the necessary labour to carry on the work. One of the new extensions was a breeze washer, intended to separate the coke from the boiler-clinker and retort-fire ashes, so that it could again be used as boiler fuel or for other purposes—the resultant clinker being a very fine material for concrete making. Another extension was the fixing of a gas-boosting plant, to enable them to raise the pressure on the district mains when necessary. A third extension going on at present was the completion of a 24-inch main, connecting-up the new scrubber-washer section with the purifiers. This will enable them to get the new section put to work for the coming winter. The scrubber-washers themselves had been com-

pleted for some time; but the final connecting-up has been delayed, due to the present circumstances of labour and material. The benzol recovery plant had been in operation for some months. It had been erected by themselves from second-hand material, and had been highly commended by one of the Government Inspectors as being most efficient. The Explosives Department gave them credit for erecting the whole plant with their own material and men, knowing that, had they depended upon a new plant from one of the makers, it was a question as to whether the material would have been delivered by this time. This was extremely creditable to their Engineer (Mr. W. B. Farquhar). In connection with the carbonizing department, the coal elevating plant was being extended, and a new tar-main and tar-tower erected for one of the inclined retort-benches. The stocks held by the Company in the various goods required, not only for the works but for district use, were very good.

The report was adopted, and the dividends recommended were declared.

Replying to a vote of thanks, the Chairman said that personally he did not think gas companies had been treated fairly by the Government. They called for certain material which they required, but did not give the undertakings any assistance in producing it.

LINCOLN GAS-WORKS' ACCOUNTS.

The accounts of the Lincoln Corporation Gas-Works for the year ended March 31 last show an income of £68,307, and a gross profit of £14,237; the net profit being £6269. Expenditure increased by £8897, owing to the high price of coal and material of all kinds, labour, increased income-tax, and heavier charges for maintenance and repair of works, plant, and mains. Compared with the expenditure in 1913-14, there is an increase of £14,255. The income increased by £9588 compared with last year, and £12,924 in 1913-14.

The price of gas was raised 3d. per 1000 c.ft. from April, 1915; and a further increase of 3d. took effect during the last quarter of 1915-16. The discontinuance of street lighting resulted in a further reduction during the year in the demand for that purpose, and over 30 million c.ft. compared with 1913-14. Private consumers took 8 million c.ft. more during the year; and the demand for power purposes increased by a million c.ft. during the year. The net result is an increase of 15 million c.ft. compared with last year, and a reduction of 8 million c.ft. compared with 1913-14. Residuals realized £4315 more.

The annual report of the Gas Manager (Mr. W. H. Mainwaring) states that the make of gas shows a considerable advance both on 1916 and 1915, and nearly reaches the maximum figure of 1914. The greater part of this increase was made during the spring of 1917. Carburetted water gas was manufactured only during those months of the winter when the coal-gas plant was inadequate to cope with the requirements of the city; and the stock of oil in hand at the commencement of the year was sufficient to meet necessities over this period. No new mains were laid during the year; and the number of new consumers added was fewer than for many years past. Owing to the difficulty of obtaining meters, cookers, and the necessary pipe and fittings, together with their greatly advanced cost, it has not been possible to carry out many of the orders in hand; and this will undoubtedly occasion inconvenience during the ensuing season. There has been a remarkable increase in the number of fractured mains, due presumably to the exceptionally heavy traffic, in conjunction with the severe weather; and the quantity of gas lost was accordingly greater than for several years. Coke has been, and is, in such request that it has been imperative to restrict its use so far as is possible to purposes for which it is essential. Sulphate of ammonia has also been in great demand; and the quantity made was not nearly sufficient to meet all the requirements.

PADIHAM GAS-WORKS DEFICIT.

In the course of his annual report, Mr. A. J. Harrison, the Gas Engineer and Manager to the Padiham Urban District Council, states that there has been a decrease in gas made of 2,812,796 c.ft., and of 4,635,558 c.ft. in the gas sold. The latter figure was equal to about 5·7 p.ct. when compared with the previous year. The decreased consumption, when compared with 1913-14, was equal to 10·5 p.ct., almost one-half of this being due to the restricted public lighting. The department was fortunate in carrying a satisfactory stock of coal during the year, although the quality was much below that supplied during pre-war times. Deliveries had not been as satisfactory; and the question of obtaining adequate supplies of suitable coal for the coming winter's requirements was a matter of much anxiety. The condition of the coke market had been fairly good, there being a steady demand throughout the year; and realized prices showed satisfactory increases when compared with the previous year, but not sufficient to meet the increased cost of coal and labour. Further experiments had been made with vertical retorts, with fairly satisfactory results. The alterations to the heating of one of the settings, sanctioned by the Committee, had, however, delayed the completion of the final tests.

The cost of public lighting during the year was £121, against £491 for 1915-16, which, while resulting in a considerable saving on the district rate, was a loss of revenue to the department. The average annual cost of public lighting during pre-war times was about £1100. The revenue expenditure and income during the year was £13,451 and £16,983 respectively, leaving a gross profit of £3532. The net revenue account, after allowing for interest &c., showed a deficit of £1247. The expenditure showed an increase of £1038 over 1915-16, the principal items being in respect of the new show-rooms, retort renewals, wages, rates, and taxes. There was a total decrease in revenue of £429 compared with 1915-16. The increase in the rates

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A LARGE FIRM OF ENGINEERS WRITE: March, 1917.

"We would like to say that during the recent severe weather, our Works were kept just the proper temperature with the lay-out of Radiators which you suggested and which we adopted. Although we were working night and day, we did not have a single complaint as to the place being too cold."

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charged for gas was equal to about 5 p.ct. It became increasingly difficult each year to forecast with any accuracy the estimates of the department, especially in regard to gas consumption, upon which the items of income and expenditure were based. It would have been possible, had the consumption remained at the figure for 1913-14, to have met the capital charges on the undertaking without having to increase the price of gas at all, even with the advances up to the present in material and wages. There would appear to be every indication of a substantial increase in the consumption during the present year. If the consumption continued to increase at the present rate throughout the year, there were reasonable grounds for assuming that the department would finish the year with a "straight edge" at the present rates charged for gas. But if there was a falling-off in consumption through the coming winter, the Committee would require to reconsider the prices charged. A perusal of the analysis showed that during 1915-16 the net cost of producing and delivering gas to the consumers' meters at Padiham was 16·64d. per 1000 c.ft. sold; while the average for 73 leading municipal undertakings was 17·96d. During the year 1916-17 the cost had increased to 18·10d.; and while not being able to compare this figure with the same undertakings this year (the published figures not yet being available), a comparison with sixteen large gas companies just published showed a difference in favour of Padiham of no less than 10·60d. per 1000 c.ft. Taking the working and financial results throughout, he was of opinion that, even with the reduced output, the department was manufacturing and distributing gas at a figure which would bear favourable comparison with the largest undertakings.

High Wycombe Gas Company.—The accounts of the High Wycombe Gas Light and Coke Company, Ltd., showed a profit on the operations during the first half of the present year amounting to £1419; and adding to this the balance brought forward and bank interest, there was a total of £4561. Out of this it was decided to pay dividends at the rate of 10 p.ct. per annum on the original shares and 7 p.ct. per annum on the additional shares, leaving a balance of £3139 to be carried forward.

Dover Gas Company.—An increase of 8 p.ct. in consumption, as compared with the corresponding period of last year, was announced at the half-yearly meeting of the Company, when the Chairman (Mr. W. Mannering) said that, should no unforeseen circumstances arise, they might expect the revenue of the current half year to be sufficient for the next dividend. The net profit of the past six months amounted to £1837; and a dividend was declared for the half year at the rate of 7½ p.ct. per annum, less income-tax, which will reduce the undivided profits by £975. Sixty of the employees have joined the forces; and cordial acknowledgment was made of the loyal way in which the officers, staff, and workmen have served the Company in the trying period passed through.

COAL GAS AN ALTERNATIVE TO PETROL.

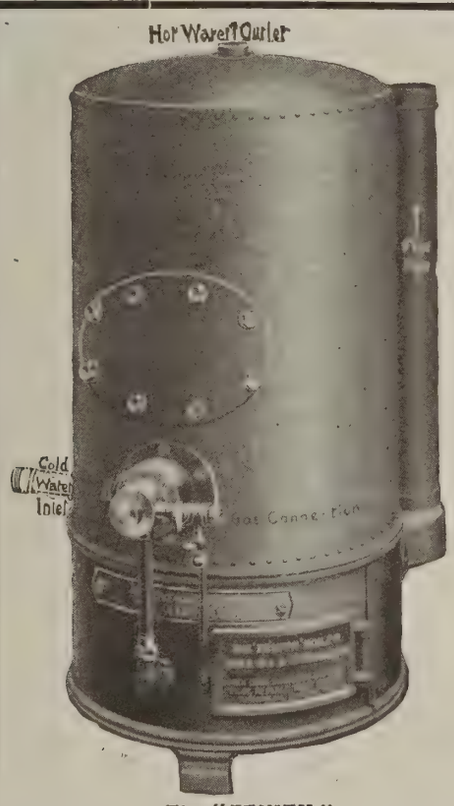
A FORTHCOMING DEMONSTRATION IN LONDON.

[From the "Light Car and Cyclecar."]

Looking round for a substitute [for petrol], it is apparent that it will be a long time before the steps taken by the Government to develop home-produced fuels will materialize. There is very little possibility of the price of petrol being controlled; and if ever it were, we fear that we should merely retain the present price as a maximum, without any reduction. Liquid substitute fuels are banned. We can see but one alternative, and that is coal gas. The use of coal gas for private vehicles is making great strides. When we consider that 1000 c.ft. of gas costing (say) 3s. will do the work of 4 gallons of petrol costing 16s., the difference in running costs is so enormous as to make it perfectly apparent that the relative expense of the additional fittings and the gasholder is very slight. Let us place the difference in running costs as low as 12s. for every 4 gallons of petrol used, equivalent (say) to 150 miles running for a light car. Therefore, 3000 miles running will more than cover the cost of fitting a gas-bag, while it would render us independent of the restrictions on petrol supplies. We know its use entails some trouble to fit up a container; that to fit a container means an initial outlay of anything from £8 to £16; that the flexible gasholder is unwieldy and unsightly; that with it we can only run short distances, 15 to 30 miles; but still we must be thankful to run at all. It is argued that coal gas will be dropped after the war, or as soon as the price of petrol comes down. That may be a long time yet, and meanwhile it would enable us to run a car which we could not do otherwise. Furthermore, the development of coal gas will act as a powerful menace to the petrol interests, and check increased prices of motor spirit, in exactly the same way as the popularity of benzol before the war checked the manipulations of the petrol concerns. Coal gas is now making very great development; and at the end of this month a demonstration will take place in London of a number of vehicles which have been fitted up to run on it.

COAL GAS FOR BOILER FIRING.

The following table gives results of some tests of coke-oven gas, as compared with coal, used for firing a Stirling water-tube boiler, as published by Mr. A. W. Morgan in the "Electrical World." The gas was a first-run quality, averaging over 600 B.Th.U., and was delivered from fire-clay nozzles to play upon a bed of incandescent coal or fire-brick broken to egg size. The figures show that mixed coal and gas is 8, and



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gas alone 21 p.ct. more costly than coal; but the actual costs of coal and gas are not stated.

	Coal.	Coal and Gas.	Gas.
Coal used per hour, lbs.	4374	..	..
Equivalent in lbs. of coal per hour	..	1,278	2,006
Gas burned per hour, c.ft.	..	29,163	47,785
Equivalent in lbs. of coal per c.ft. of grate surface	37·8	49·4	17·45
Ash and refuse, p.ct. of total coal	18·9	21·4	..
Temperature of flue gases leaving boiler (deg. Fahr.)	640	683	517
Draught over fire—inches of water	0·36	0·29	0·03
,, under outlet damper	0·92	0·82	0·06
Efficiency of boiler, grate, and furnace, p.ct.	61·4	61·6	73 0
Efficiency of boiler and furnace	66·1	68 9	73 0
Combustible matter in ash—p.ct. total coal by weight	8·8	11·7	..
Cost to produce 1000 lbs. steam from and at 212° Fahr. in cents.	11·6	12·6	14·1
CO in flue gas, p.ct.	10·43	12·37	6·75
O ,, ,,	10 50	4·85	7 85
N ,, ,,	79 07	82·78	85·40
	100·0	100·0	100·0
HEAT BALANCE-SHEET.			
Heat absorbed by boiler	61·4	61·6	73·0
,, loss by moisture in coal	0·3	0·3	..
,, ,, hydrogen in coal and gas	4·1	6·2	12·6
,, ,, dry flue gases	16·9	13·7	9·6
,, ,, unconsumed carbol in coal	9·5	9·8	..
,, ,, apron water	0·7	0·6	0 1
,, unaccounted for	7·1	7 8	4 7
	100·0	100·0	100·0

NEED FOR SMALLER GAS LIGHTING UNITS.

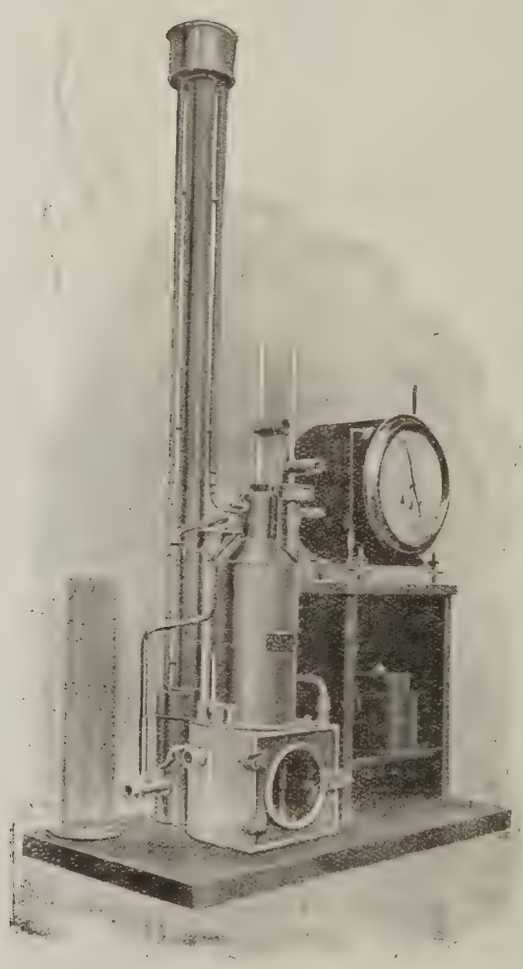
In the course of a communication to the "Gas Age" [New York], the writer comments on the fact that many gas undertakings confine their selling operations chiefly to large units, consuming 10 c.ft. of gas per hour and upwards, and entirely neglect the extensive demand for small light centres, with the result that a large portion of the lighting is left to the extravagant and unsatisfactory flat-flame burner—a fact greatly in favour of other competing lighting agents. When these once obtain a footing, they may be successful in securing the whole. Surely it is better to give an all-round satisfactory service with gas, even at a slight loss on the smaller units, which may perhaps not use sufficient gas to cover the cost of maintenance, than to allow a large part of the lighting business to fall away by default. But the difficulty is that, owing to the neglect above named, there are no small incandescent burners on the market. If a salesman seeks to displace a small flat-flame burner, he has nothing less than a 40-candle unit or so to offer. It is quite practicable to manufacture either upright or inverted incandescent burners down to (say) 5 c.p.; and there is a good market for such small burners

Many factories and warehouses for this reason retain the flat-flame where a small light is required; and the writer instances as an example a worsted yarn factory, formerly lighted entirely by flat-flames. Some few years ago they replaced a number of these by twenty-one No. 30 Humphrey high-power incandescent burners; but as these were not suitable for narrow passages and other places where a large light was not required, many of the old pattern were retained. The new burners were supplied by the Gas Company on hire-purchase maintenance terms, and were so far satisfactory that after a time the consumer agreed to entirely displace the flat-flames, and for forty-five Radio-X burners to be furnished on similar terms, to be paid for at the rate of 1s. 6d. per month for eighteen months, when they would become the property of the purchaser. No maintenance charges were made during the summer, when the light was not required. The installation now comprises the twenty-one three-mantle high-power lamps, five single-mantle, and forty-five Radio-X, all maintained by the Company; and it is open to the consumer either to undertake his own maintenance or to arrange with the Company to do so, when the whole becomes his property. While accepting this arrangement, the consumer complains that in many places the Radio-X give much more light than is necessary, and that with smaller units he could get equally satisfactory results, with an appreciable economy of gas.

Lighting of Lye.—The District Council of Lye (Worcestershire) have decided to give the Gas Department of the Stourbridge Town Council six months' notice to terminate the public lighting contract. This drastic step has been taken by Lye after many protests against the refusal of the Stourbridge Gas Department to reduce by £10 the charge of £160 made by them for the unlighted lamps in the urban district.

Coal Gas as Motor Fuel.—The Limavady (co. Londonderry) Urban Council have decided to grant an application for a supply of coal gas for use as motor fuel, in connection with a new motor-bus service between the town and Londonderry City. It was stated the firm would require at the Limavady end about 200 c.ft. of coal gas each journey, or from 400 to 500 c.ft. per running day, and that arrangements had been made for a supply at Londonderry as well.

SIMMANCE'S PATENT



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It automatically prevents low results due to differences in humidity, inlet and outlet air temperature, and varying inlet water temperature, which are difficult to avoid with ordinary calorimeters.

SIMPLE AND ACCURATE.

SOLE MAKERS—

ALEXANDER WRIGHT & Co.,

LIMITED,

WESTMINSTER.

Agents { Australia: FYVIE & STEWART, 360, Collins Street, Melbourne.
Canada: W. P. ROPER, 502, Merchants Bank Building, Montreal.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 17.

The London tar products market remains without marked change. Orders have recently been issued bringing transactions in tar and light oils under the control of the Government from the 1st of October; so that the range of products for which there is still an open market is narrowing. Pitch continues firm, and inquiries are still being received for export; makers' price being not below 45s. net per ton f.o.b. works. There is no change to record in the values of other products.

Orders continue to be received for sulphate of ammonia for home agricultural purposes, for both prompt and forward delivery, under the Government scheme of prices.

Tar Products in the Provinces.

Sept. 17.

Markets for tar products remain about the same. Pitch keeps steady. Solvent naphtha is slightly better.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. 3d. to 27s. 3d. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10¼d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. [In the "JOURNAL" for Sept. 4, the price of this article was inadvertently given as 6¾d. to 7¼d. The quotation should have been 6½d. to 6¾d.] Solvent naphtha, naked, North, 2s. to 2s. 1d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4½d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Rather more activity has been reported in the market during the past week. The Continental demand for pitch is maintained, and, shipping facilities remaining relatively favourable, the price continues at about 48s. per ton, with a tendency towards a higher figure. The Provincial position remains unaltered, except that stocks are accumulating. Nevertheless, makers look hopefully to the future, and feel quite safe in refusing current offers. How long they will maintain this attitude it is impossible to say; but, if present conditions regarding shipping facilities continue, a position of some difficulty will result. There is a large inquiry for solvent naphtha in big lots; but the supply does not appear to be equal to the demand. The market has, consequently, become very firm; and up to 2s. 6d. per gallon has been paid. Crude benzol and dehydrated tar are to be controlled from the 1st prox., and considerable inconvenience is already being created by the system of licences required before business can be done after that date. Creosote remains nominal. Cresylic acid—one of the few products in which there is a free market—is better again on an increased demand. Naphthalenes also are good, and quotations remain firm. The lower qualities of crude are in special request for the firelighter industry, and higher prices may be expected. Aniline oil is quiet and carbolic acid unchanged. In other products there is nothing of particular interest to record. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per gallon.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 3½d. to 1s. 4½d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 4d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d.; North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 8d. to 1s. 9d.; North 1s. 3d. to 1s. 4d. per gallon; 90-160% naked London 2s. 4d. to 2s. 5d.; North 2s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

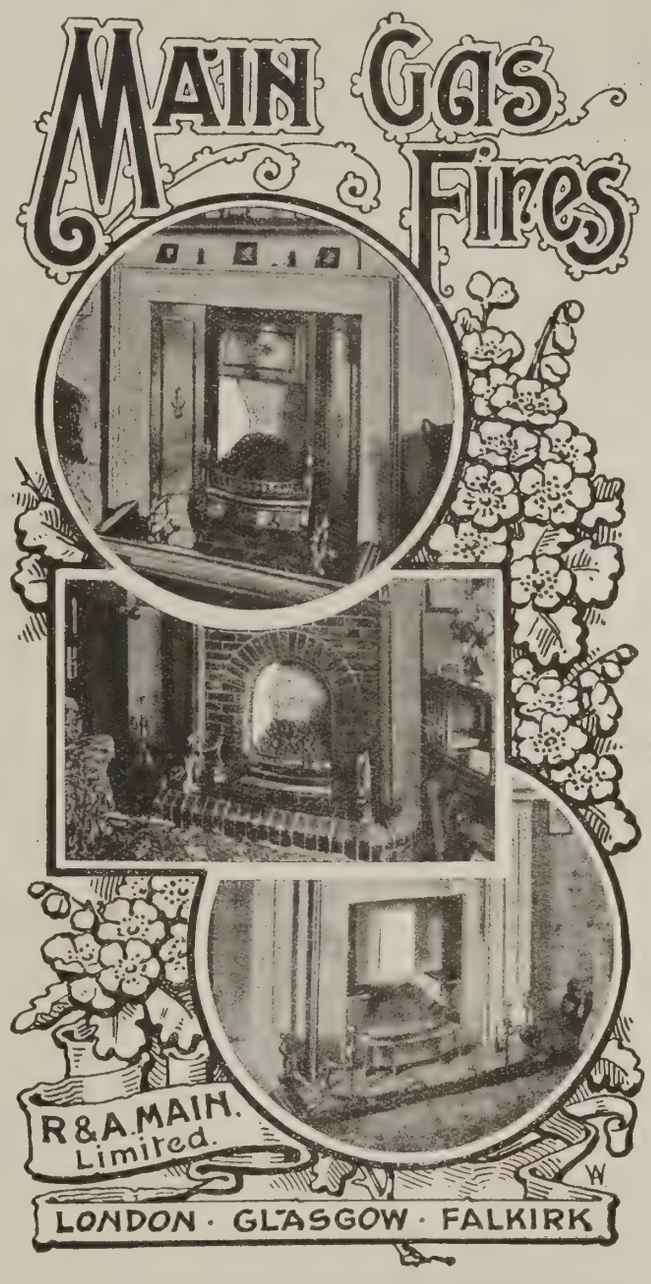
Cresylic Acid: 95%, 2s. 5d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 2d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

During the past month just over 7000 tons of sulphate have been exported; the average price being about £21 per ton. This quantity is very considerably less than the average monthly exports of normal times; and, in view of the very strict control being exercised, there seems little chance of any improvement in the export trade. There are also considerable misgivings regarding the outlook for this part of the trade after the war. At the present time by far the greater bulk of the output is going to supply the home agriculturist; and the coming season will witness a greatly extended use of the fertilizer. The automatic rise in the quotation next month will probably be without effect on the demand, as farmers have been forewarned for some time. Fortunately, there is some probability that the home trade will continue to increase, and so make good to a fair extent the loss in export trade

MAIN'S NEW FOLDER IS READY.



Supplies of this handy List will be sent upon application. It contains the latest information and prices of the popular "Main" Fires, Radiators, &c.

Place your Season's Orders early.

We have commenced our deliveries.

R. & A. MAIN, Ltd.,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

that is now going on. Very little has been released for shipment during the past week. The export price remains at about £24 per ton. In America, the demand for both domestic and foreign account continues unabated, and prices are rising again.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 15s.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

There is a good demand for coal; but the new regulations for distribution are in some degree interfering with the trade, and with the supply of wagons. It is hoped, however, that a week or two will make the working smoother. In the steam coal trade, the demand for best kinds is full; but that for second qualities is only moderate. Best Northumbrian steams are 30s. per ton f.o.b.; for second-class qualities, about 25s. 6d. is the current quotation; and steam smalls are very plentiful, and are still from 18s. 6d. to 20s. 6d. The gas coal trade is also a little disturbed temporarily by the restriction in the area of the distribution; but the demand is normally increasing at the present time. The trade done by sea, which is heavy, is not affected; while the well-known excellence of Durham gas coals causes preference to be given especially to the higher qualities. Best Durham gas coals are about 25s. per ton f.o.b.; second-class descriptions are quoted at 23s. 6d.; and "Wear Specials" are from about 27s. 6d. to 30s., with a full demand. Freight on gas coal is firmer; the supply of steamers being inadequate. The rate quoted is about 19s. to 20s., Tyne to London. To neutral countries, freights are at record heights. In coke, the local demand is higher; but the production is also increasing. Good gas coke is from 29s. to 31s. f.o.b. in the Tyne. Coke freights are high; 46s. having been paid to the northern ports of France.

Strike at Aberdeen.—A strike of gas-workers at Aberdeen, involving 300 employees, necessitated the calling in of a number of volunteers. Eventually it was agreed to refer the question to Sir George Askwith, and that the workers should meanwhile return to their employment.

A Tribunal's Exemptions.—At the Southwark Tribunal last week the Military Representative said he had received the latest instructions with reference to men holding certificates of exemption under the protected trades schedule. These were that he was not to oppose any application to the tribunal for the exemption of a man who had his protection certificate withdrawn, so long as the application was made within seven days after he had received his calling-up notice to join the army.

Effect of High Wages at Ossett.—At a meeting of the Ossett Town Council last week, the Mayor, speaking for the Gas Committee, reported that, in the twenty-one weeks of the current financial year, the cost of wages and war bonuses in the Gas Department had been £565 more than in the corresponding period of last year. At this rate, the cost for the present year, as a whole, would be about £1300, and was likely to absorb the whole of the extra revenue produced by the advance of 3d. per 1000 c.ft. in the price of gas.

South Staffordshire Mond Gas (Power and Heating) Company.—The assent of the shareholders is asked to the raising of £205,000 of "prior lien debenture stock." In order that the present plant may be enlarged, the Ministry of Munitions have agreed to lend the necessary money provided they are given a charge in priority to the existing debenture stock. Holders of the latter stock are, therefore, asked to assent to the raising of the above-named debenture stock, power for which will be obtained by a further application to Parliament.

Goole Gas Department Losses.—The statement of accounts of the Goole Urban District Council Gas Department, for the past year, submitted last Wednesday, shows a loss of £1576, which, following a loss of £2742 on last year, has practically absorbed the reserve fund. The output of gas was 31 million c.ft., as against 32½ million c.ft. last year. The price of gas, it was stated, has been advanced from 3s. to 3s. 9d. per 1000 c.ft. since September, 1915, and the price of coke from 15s. to 18s. 4d. per ton. The Council referred the accounts to a Sub-Committee, to consider and make recommendations in respect of the remaining period of the present financial year.

Heavy Gas Consumption at Dudley.—Some striking figures were quoted at a meeting of the Dudley Town Council, when Alderman Thompson stated that the Gas Company had been going through a trying time. The increase in the consumption had amounted to 60 p.ct. in 1916, and 80 p.ct. for the current year; and the Company had not been able to instal sufficient plant adequately to deal with it. New plant was being put in; and until this was completed, the Company had entered into an agreement with Tipton and Brierley Hill to supply the town with such quantity of gas as would restore the pressure to its normal state. The Mayor (Mr. Lloyd) said this intimation would be greatly appreciated by users of gas, some of whom had had to resort to candles.

Gainsborough Gas-Workers' Wages.—Trouble which had been for some time pending between the Gainsborough Council and a number of employees engaged at the gas-works culminated recently, upon the suggestion of Sir G. Askwith, Chief Industrial Commissioner, in a reference of matters in dispute to Mr. W. A. Willis, who, as Arbitrator, has now made his award. He has decided that the claim of yardmen, or reserve stokers, to an increase of wages, beyond 13s. 3d. weekly already granted, has not been established, but that a 2s. war bonus granted to the gas stokers should be increased as from Aug. 3 to 5s. weekly. Dissatisfied with the award, the yardmen now threaten further difficulty; several having handed in their notices. The local authority have therefore placed themselves in communication with the Ministry of Labour; it being recognized that the supply of gas must be maintained under any circumstances.

Gas Heated Hot Closet admirably suited for warming workmen's dinners. It is divided into 60 compartments or lockers, each 8 in. × 6 in. × 8 in., with perforated sides, and constructed with steel plates, atmospheric Gas Burners in top, centre and bottom, with separate taps.

Well-fed Workmen are invariably efficient Workmen.

By Appointment. CARRON

The feeding of the workmen, therefore, would seem to practically solve the output problem.

To do this successfully, get into touch with Carron Company to-day and see their profusely illustrated Gas Appliance Catalogue. It will be sent you free.

If in any difficulty, write giving full particulars of your requirements, and receive in return drawing of suggested equipment with full specification—free of cost or obligation.

CARRON GAS APPLIANCES

are pronounced by the catering world to be unequalled for strength and efficiency, and have been adopted by the leading HOSPITALS, INFIRMARIES, HOTELS, STEAMSHIP LINES, WORKS' KITCHENS and MILITARY CAMPS.

¶ **Catalogues or Drawings and Estimates of suitable Appliances free of cost or obligation.**

CARRON COMPANY *Works:* CARRON, STIRLINGSHIRE

Branch Works: Phoenix Foundry, Sheffield.

FOUNDED 1759. INCORPORATED BY ROYAL CHARTER 1773.

Bexhill Water and Gas Company.

It will be reported at the meeting next Tuesday that the accounts for the half year to June show a balance at the credit of the profit and loss account available for dividend of £8295. The Directors recommend that a dividend be declared for the six months at the rate of 6½ p.ct. per annum on the capital authorized by the Acts of 1885 and 1892, at the rate of £4 11s. p.ct. per annum on the capital authorized by the Act of 1896, Order of 1901, and Act of 1904, and at the rate of 5 p.ct. per annum on the preference capital, less income-tax. This, with provision for income-tax, will absorb £4282, leaving £4013 to be carried forward. The business of the Company continues to progress; but the cost of coal and stores has again materially increased. In order to assist in the production of explosives, and in compliance with the wishes of the Government, it has been arranged to instal a plant for the production of benzol. An application was made under the Gas (Standard of Calorific Power) Act, 1916, for an Order to substitute a standard calorific power of 500 B.Th.U. per cubic foot of gas for the standard illuminating power prescribed by the Company's Act of 1885; and the Board of Trade have made the Order.

Hastings and St. Leonards Gas Company.

The Directors reported at the recent meeting of the Company that the accounts for the half year ended June 30 showed a profit balance of £8646, which was insufficient to meet the standing charges and statutory dividend. It was therefore proposed to take the sum of £437 from the balance brought forward. There was an increase in the demand which, coming with a seriously depleted staff, caused a severe strain on the Company's resources. The cost of material and labour at the same time increased to an extent beyond anything that could have been anticipated; and it consequently became necessary to raise the price of gas 2d. per 1000 c.ft. from the Midsummer reading of the meters. The Chairman (Dr. G. G. Gray, J.P.) pointed out that the receipts showed an increase of no less than £10,206; but to secure this they had to expend an increased sum of money of a little more than £1600 in excess of the increased receipts. The receipts would have been even larger had they been able to supply all the apparatus required. At present there were orders for some 150 cookers, which they had not been able to obtain and fix. As compared with pre-war years, the cost of coal had increased 100 p.ct., while the price of gas had only been raised 34½ p.ct. They were paying a heavy amount in war bonuses and allowances to employees whose places were being kept open for them. The report was adopted, the statutory dividends were declared, and cordial acknowledgment was made of the services of Mr. C. F. Botley (the Engineer and General Manager) and the staff.

Profit-Sharing at Gloucester.—The Committee submitted at the ninth annual meeting in connection with the Gloucester Gas Company's profit-sharing and saving scheme a report for the year ended June 30 which stated that the bonus divisible among the members was £314, or at the rate of 3½ p.ct. for the year. The present number of members is 113.

A Good Balance-Sheet at Woking.—One of the best balance-sheets they had had for a long time was the description given by the Chairman, Mr. C. H. Master, to the accounts [*ante*, p. 391] submitted at the half-yearly meeting of the Woking District Gas Company. A great deal of the prosperity of the Company, he added, was due to their able Manager (Mr. W. H. Ely), who had, with the Board, looked after the shareholders' interests very thoroughly. After payment of the dividends, there would be a sum of £1815 to be carried forward. The gas unaccounted for was 7·45 p.ct. of the make, which compared with 12·14 p.ct. in 1916.

Coal Gas for Motors.—A discussion of considerable technical interest in relation to the substitution of coal gas for petrol for motors took place at a meeting of the Motor Trade Association, which was held at Nottingham last Thursday, and attended by 250 delegates from various parts of the United Kingdom. Mr. A. H. Goodwin, who presided, predicted that a "rough time" was in store for the industry after the war, and urged the necessity of more complete organization. Other speakers foreshadowed that, in view of the probability of the petrol famine becoming more acute, increasing use would have to be made of coal gas; it being claimed that, while much cheaper, it was only slightly less efficient than petrol.

A Special Sub-Committee of the Batley Town Council, considering an application by the Corporation employees for an increased war bonus, have decided to recommend an all-round advance bringing the bonuses up to 10s. per week.

In connection with their motor lorry service, Messrs. Thomas Glover and Co., of Edmonton, are asking gas companies with arrangements for filling-up, within a hundred miles of London, to communicate with them. This is one of the "straws" that point out a direction in which there will be a considerable use of gas in the very near future.

The price of gas is increased at Aberdeen from 2s. 6d. to 2s. 9d. per 1000 c.ft. to domestic consumers, and from 2s. 2d. to 2s. 5d. for gas-engines and industrial purposes. At Motherwell, the price has been raised from 3s. 4d. to 3s. 9d. per 1000 c.ft. Owing to the increased rate of interest on loans, there is an extra expenditure of £3000 a year.

The Gillingham Electricity Committee have decided to adapt the two engines at the electricity works for use with tar oil, at a cost of about £250. It is calculated that, the cost of tar oil being 115s. per ton against the present price of fuel oil of 211s. 3d., the saving to the end of March next would be from £700 to £800, after paying for the cost of the apparatus and installation.

Difficulty is being experienced at Halifax in securing enough lamp-lighters for work during the winter; and the Gas Engineer (Mr. W. B. M'Lusky) says he may have to ask for women for the job. It is proposed to light 1700 lamps, or roughly one-third the full number in the streets. The Gas Committee are appealing to discharged soldiers to take up the work.

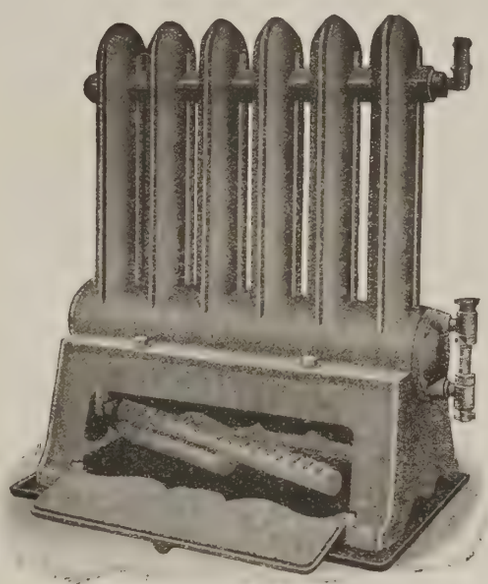
We Hold Good Stocks

OF OUR

"RADIO"

GAS HEATED STEAM

RADIATORS.



Dimensions—

Length, 20in. Height, 22½in. Depth, 11in.

Approx. Heating Capacity for Workshops, &c.—

1500 CUBIC FEET OF SPACE.

List Price, 53/6 Each.

Complete with Base Plate.

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CANNON IRON FOUNDRIES, LTD:,

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MOLDEN & BUDDEN PTY., LTD., 364a, Little Collins St. Melbourne, Vic., and at Sydney, N.S.W.

STOCK MARKET REPORT.

There was not much change last week in the general outlook of things on the Stock Exchange from the dull tone which had depressed it the week before. But, on the whole, there was some improvement; and the atmosphere became less heavy before the close. Russian affairs were, of course, the mainspring; and, after a gloomy opening, by mid-week the long persistent fall in securities was checked. From this point a recovery set in which affected Russian issues of all descriptions. Other markets did not pick up readily. The question of the next War Loan—its what and its when—continues to enjoy anxious consideration.

The gilt-edged market came out at the end of the week in very fair condition. Home Government issues kept their end up, and the War Loan showed praiseworthy firmness. Indians and Colonials were less so. Home Rails were little noticed until nigh the close. Lines in the Western Hemisphere were dull. Argentines were heavy, borne down by increased expenses, poor traffic, and Government ill-will. The Foreign Market was not particularly strong, apart from the Russian recovery; but Scandinavians and Chinese were in favour. South Africans were irregular.

The Miscellaneous Market could point to some bright spots. Rubber was firm, and Oil recovered much of its lost ground. Explosives and Nitrates continued in brisk demand.

Business in the Gas Market was rather more active, and bargains were pretty well distributed among the list of undertakings. The general tendency indicated by recorded prices was firmness. Changes in quotation owing to *ex div.* variations were numerous; but other changes were confined to Imperial Continental and Primitivas, all of which were in the upward direction.

In the Money Market, there was a steady demand, and rates were quite firm almost up to the close.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 79½, 80, European 11, Gas Light ordinary 72, 72⅜, 72½, 73, ditto maximum 57, 57½, 57⅞, ditto preference 71½, Imperial Continental 84, 85, Primitiva 41s. 3d. On Tuesday, Brentford "B" 76, 76½, 77, British debenture 69, Gas Light ordinary 71⅞, 72, 72½, Imperial Continental 84, 84½, Portsea "C" 74, 74½, Primitiva 41s. 3d., 42s. 3d., 42s. 6d., 43s. 1½d., ditto preference 61s. 3d., 63s. 9d., South Metropolitan 72½, 72⅜, 73, South Suburban 75, 75¼. On Wednesday, Gas Light ordinary 71½, 71⅜, 72, 72¼, 73, ditto maximum 57, ditto preference 71, 71½, ditto debenture 56, 56¼, 56½, Imperial Continental 74½, 75, Primitiva 43s. 9d., South Metropolitan 72½, 72¾, South Suburban 74¾, 75½. On Thursday, British debenture 69½, Cape Town preference 6⅞, 7, Gas Light ordinary 71⅜, 72¼, ditto preference 70½, Metropolitan of Melbourne 99, 100, South Metropolitan debenture 55½, Wimbledon 87, 87½. On Friday, British 33⅜, 33¼, Commercial 4 p.ct. 71, 71¾, Gas Light ordinary 71½, 71¾, 72, 72½, ditto maximum 56¾, 57½, 58, ditto preference 70¾, Imperial Continental 84, 85½, Primitiva 42s. 6d., 43s. 3d., 45s., South African 8⅜, South Metropolitan 72½, 73, 73⅓, ditto debenture 56¼, 56½, South Suburban 75⅜. A bargain was marked in Tottenham "B" on Tuesday at 80; the official quotation is 66-71.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	5—5½	..
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water (10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.)	29—30	23—25	..
						15—15½	10½—11	..
883,110	10	,,	7	7%		13½—14	9—9½	..
115,000	10	,,	6	6/-		..	69—71	..
159,740	—	—	—	4%		261—266	79—82	79½—80
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid.	204—209	76—79	76—77
734,920	,,	,,	11	4⅞%	Do. B New	109—111	81—86	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	91—93	65—67	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	208—213	145—150*	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	154—159	98—103*	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	44—45	33—34	33½—33¾
530,000	20	Mar. 26	12½	22/6	British	88—90	63—70	69—69½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	85—87	53—56	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	1½—2½	2⅜—3¼	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	..	6½—7½	6⅞—7
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	70—75	60—65	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	108—110	78—79	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	106—108	70—72	71—71¾
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	103—105	64—66	..
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	69½—71½	51—53	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	76—79	39—41	..
800,000	,,	,,	4	—	Continental Union Ltd.	115—118	61—63	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	..	165—175	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	..	..
—	—	—	—	10%	Do. E	123—125	95—100	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	102—104	80—83	..
55,000	,,	—	4	4%	Do. Deb. Stk.	17½—18	11—12	11
1,002,180	10	July 29	10	5/0	European, Ltd.	98—102	71—73	71½—73
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke (4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds)	76—79	56—58	56⅝—58
2,600,000	,,	,,	3½	3½%		96—99	70—72	70½—71⅝
4,062,235	,,	,,	4	4%		72½—74½	55—57	56—56⅞
4,674,850	,,	June 11	3	3%		..	..	..
130,000	,,	,,	10	10%		87—89	46—53*	..
258,740	,,	Mar. 12	5	3⅜%	Hastings & St. L. 3½ p.c.	16½—16½	7½—8½	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	..	115—125*	..
26,600	—	—	—	9%	Hornsey 7 p.c.	151—154	92—97*	..
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	115—118	72—77*	..
65,780	,,	,,	6⅜	5½%	Do. B	92—94	65—68	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	150—160	83—88	84—85
4,940,000	,,	May 14	9	4½%	Imperial Continental	84—86	62—65	..
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	119—121	82—87*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	211—213	81—82	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. (A / B)	146—148		..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne (4½ p.c. Deb.)	99—101	88—98	99—100
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7/10	North Middlesex 7 p.c.	14—15	9¼—10¼*	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	74—74½
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	2 1/16—2 5/16	41/3—45/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	3 1/16—3 5/16	61/3—63/9
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. / 5 p.c. Deb.)	10½—11	7⅜—8¼	..
125,000	50	July 1	5	5%		47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	180—184	..
209,984	,,	,,	10	10%	Do. B	222—224		..
523,500	,,	,,	10	10%	Do. C	220—222		..
90,000	10	May 28	9	6/-	South African.	10½—11½	8¼—9½	8¾
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74	72½—73½
—	—	—	—	—	Do. Pref.	—	—	..
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72⅞—74½	55—57	55½—56¾
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	74⅝—75½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4⅝%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5½%	Tottenham District (A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.)	135—138	92—97	..
782,275	,,	,,	6	4%		115—117	66—71	80
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
230,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
30,000	,,	Feb. 26	8⅜	72/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6⅛	57/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/3	50/9	Do. C 3½ p.c.	110—115	84—89	..
352,000	,,	,,	6⅛	51/3	Wimbledon 5 p.c.	117—122	85—90	87—87½
98,000	,,	,,	6⅝	57/6	Epsom 5 p.c.	121—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

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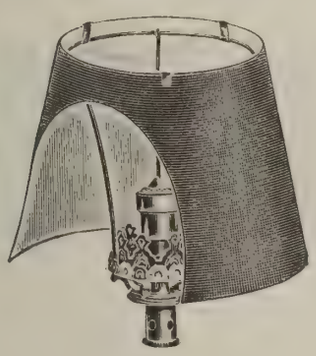

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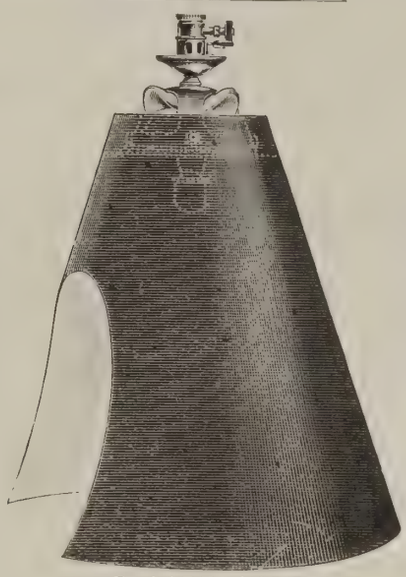

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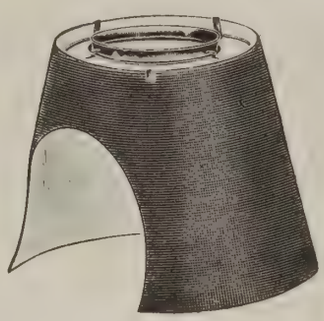

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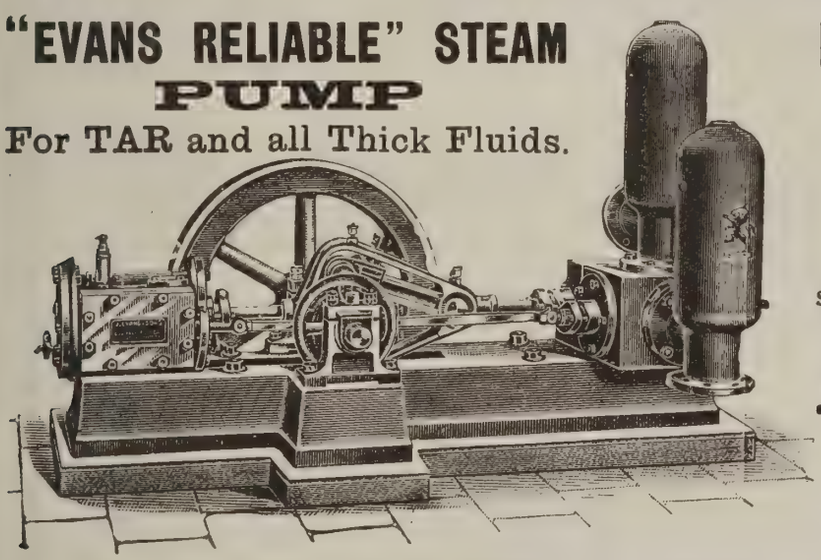

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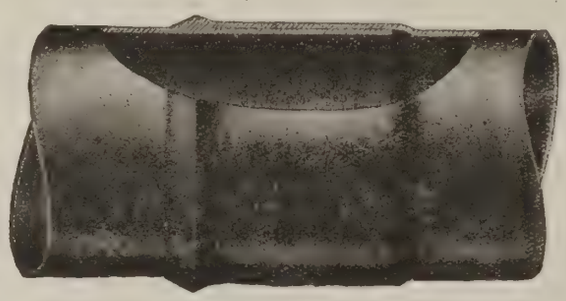

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CONTENTS.

EDITORIAL NOTES.

Fuel Oil and Reduced Carbonization Temperatures 547
The Sliding-Scale and Disappearing Dividends 547
A Contrast 548
"The Time has Fully Come" 549
The Showroom and Economical Appliances. 550
The Activities of the National Gas Council—A Benzol Producers' Committee 550
The Coal Factors' Portion—A Federation of Gas Engineers—Man Power Reorganization—The Scheme in Broad Outline—The Needs of Gas Lighting 551
Coal and Coke Exports 552

Personal 552
Obituary 552
The National Gas Council and Fuel Oil Supply 552
Electricity Supply Memoranda 553
The Coal Supply of German Gas-Works . . 554
Coal Figures for 1916 554
Federation of Gas Engineers 555

The Sliding-Scale and Disappearing Dividends. By Arthur Valon, M.Inst.C.E. - 555
Sixty Years Ago 556
Wales and Monmouthshire District Institution of Gas Engineers and Managers . . 557
Presidential Address of Mr. J. Mogford . 557
Promoting Gas Sales. By W. H. Cattell . 560
The Inflammability Limits of Gaseous Mixtures 563
Principles and Methods of a New System of Gas Firing. By A. C. Ionides 563
The Status and Prospects of Gas Lighting . 567

MISCELLANEOUS NEWS.

Manchester Gas-Works Statistics 569
Horley District Gas Company's Meeting . . 569
South Suburban Gas Company's Staff . . 570
The Recent Strike at Doncaster 570
Stockport Gas Engineer's Report 570
Sunday Labour at the Stockport Gas-Works. 570
Quality of Gas in War Time. 571
Maintenance of Gas-Lamps in Residences . 572
Current Sales of Gas Products 573
Coal Trade Report 575
Stock Market Report 578

PARAGRAPHS.

Maximum Prices for Tar Products in Switzerland 554
Calorific Standard Application and Orders—Bronze Medal in "Gas Supply"—Sensitiveness of Plants to Poisoning by Illuminating Gas—German Illuminating Engineering Society 556
Electrolysis of Gas-Pipes—Refractory Products in Germany 563
Gas and Business System 566
Reduction in Price by the Hornsey Gas Company 570
Stanton Ironworks Company, Ltd. . . . 571
Name of North British Association—Tamworth Gas Light and Coke Company—Gas Workers and Leaving Certificates . . . 574
Price of Gas at Whittington—Brighouse Wages Question—Meter-Maker's Patriotic Desire—Wandsworth Company's Increase in Price—Gas-Driven Vehicles and an Alleged Nuisance—Increase in Price at Smethwick—Reduction of Bonus without Consent 575
Wages at Burnley—Automatic Lighting in Edinburgh—Price of Gas at Maryport—Suicide in a Gas-Oven—Sligo Gas Lighting—The Loss on the Goole Gas-Works—The Sheffield Gas-Works Explosion 576
Benzol Distribution after the War—Perils of Unlit Streets—Quality and Pressure of Gas—Coal Gas for Motors 577
Applications for Patents 577

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VOL. CXXXIX., No. 2837.] TUESDAY, SEPTEMBER 25, 1917. [69TH YEAR.

EDITORIAL NOTES.

Fuel Oil and Reduced Carbonization Temperatures.

NOT long since we ventured to state that it was probable nothing more would be heard by the gas industry about carbonization at reduced temperatures, with the view of securing a larger amount of fuel oils for Government purposes. That this was a fair assumption in view of ascertained facts—facts which proved the heavy losses sustained by reduced temperature operation compared with the gain in creosote and green oils per ton of coal carbonized—is borne out by the communication we publish to-day [p. 552] from the Ministry of Munitions, with explanatory notes by the National Gas Council. We are glad to see that the Ministry of Munitions take upon themselves full responsibility for the hurried general appeal that was made to the industry. "Owing to the urgency of the situation," the Ministry write, "we were unwilling to face a postponement "of a general appeal to the industry until this information "[the cost of production of fuel oil by abnormal methods "of carbonization] was forthcoming." Granted that the situation was urgent, the issue declares that it would have been better to have first ascertained the necessary data experimentally than to have precipitated the whole gas industry into a state of uncertainty and many works into expense; for no good whatever has been effected beyond a universal proof of an inappreciation of facts that might have been gained much less expensively and more promptly—facts showing that, while the fuel oils might be increased by as much as 50 p.ct. per ton of coal carbonized, the carbonizing capacity of gas-works would have been reduced to such an extent that, in the final result, the 50 p.ct. would have largely, if not entirely, disappeared, the gas industry would not have been able to comply with its obligations, and the cost of any increase of fuel oils (if any) would have been altogether beyond sane contemplation. We do not, however, anticipate that the industry will now feel particularly aggrieved over the matter. A mistake was, unfortunately, made, for which the National Gas Council are certainly not to blame, as some critics have imagined; and no use is to be served by labouring it. The Ministry appreciate greatly the efforts that have been made by the industry, and naturally regret the result. The industry, on its part, will be glad to hear that there has been an unexpected improvement in the oil situation. It will also note that the Ministry are still desirous of entering into "arrangements "with individual undertakings which, by variations of their "present methods, are able to increase their output of fuel "oil at a cost which, though higher than the present cost, "can still provide it *at a price that can compare with that of "other sources of supply*." This does not give much scope, and therefore not much promise.

The Sliding-Scale and Disappearing Dividends.

IT has been said that in a multitude of counsellors there is wisdom. In respect of the subject of the sliding-scale, an eminent gas engineer recently hinted that, in the multitude of counsellors, there is bewilderment. Nevertheless, further suggestions were sought; and from the suggestions something may emerge that is better than anything else that has preceded. But it must be borne in mind that "Time flies." Procrastination may suit the book of some, but not of all, for every week that passes with the heavy cloud of injustice overhanging gas capital means the greater probability of the condition continuing some time ahead. In an article by Mr. Arthur Valon, which we publish this week, on the "Sliding-Scale and Disappearing Dividends," he discusses several pertinent matters bearing upon the position. There may not be agreement with all his points; but, in the main, his reasoned contentions are unanswerable. He suggests that the reluctance shown by the "chairmen "of the larger companies to make a definite effort to obtain "a revision of the sliding-scale arises, no doubt, from a "patriotic preference." That is a kindly inference. We do not, however, think the patriotic aspect has had much to do with the matter, but other considerations have had an influential weight, though the present, in view of a more hopeful prosecution of the just claims of the industry, is an inopportune time for discussing them. However, an examination of the facts of the current position points to the impossibility of any valid claim to "patriotic preference" being made in respect of a condition of things that allows the purchaser of a commodity to pay a price that will not give the investor of capital—the capital necessary to enable the commodity to be produced—a fair return for his money. Justice has an equal claim to patriotism.

Mr. Valon describes the theoretical principles on which standard prices are fixed, and refers to the net price of coal, cost of labour, and cost of capital as the base factors of the sliding-scale. He also submits that, for the purpose of a standard price, these factors are looked upon as fixed, except for small market fluctuations. From a study of existing standard prices we are not at all satisfied that promoters and opponents of Gas Bills in which the sliding-scale is being introduced do not differ as to the principles on which standard prices should be established—anyway, the divergent views as to the amount of standard prices are proof, positive that the principles are not being religiously observed. And as to the "base factors!" A study of the history of this matter shows that, without the flow of time, the fresh standard prices have been falling as the net cost of coal, the cost of labour, and the cost of capital per cent. of stock have been ascending; so that there is a misapplication somewhere of both principles and factors. Nevertheless, while all the "base factors" have been mounting up, the price of gas has been (this, of course, prior to the war) sliding down. So credit has to be bestowed elsewhere; for the assistance of coal, labour, and the higher cost of capital per cent. in producing a lowering of the price of gas, has been of a negative character. All the progress that has been made in the lowering of prices to consumers has been due to improvements in process and method and to care in management. Therefore, the conditions of to-day would have been much worse had it not been for these circumstances; and for all that has been accomplished, in the face of the upward movement of the "base factors," there is not in many companies in these war days a particle of reward left. We are with Mr. Valon in all he says as to the injustice of this.

But our contributor then gets on to more controversial ground; and what he says should be taken into account in the consideration of the question as to the extent of the alteration that should be asked for. In this matter, our view-point has been that we should never overlook the principle of the sliding-scale, that exacts a sharing of prosperity as well as of adversity in normal times between stockholders and consumers. We have now come to a position where terms framed for normal times have produced, under abnormal circumstances, a condition that is causing, and has in cases caused, capital to have but the shadow of a fair return left. And we feel a little uneasy as to what is going to happen as the result of the present negotiations between the miners and the Coal Controller in regard to a further percentage rise in wages. We must take possibili-

ties into account in considering what should be sought in making a revision of the standard price. Mr. Valon has little sympathy with those who suggest that it would be impolitic to demand the alteration of the standard price to an extent that would permit of the payment of the pre-war rate of dividend. Even if allowed to pay the pre-war rate, this would only be at the pre-war market value of money, and not at the war nor the *post*-war value. Added to this, it must not be forgotten that many shareholders—a great majority, in fact—paid premiums for their gas stocks; so that the nominal pre-war dividend is not the actual return on the money paid by them per £100 of stock held. These are important considerations; and, taking them all into account, our contributor is not of opinion that merely being allowed to pay up to the full standard dividend would meet the requirements of elementary justice. We quite agree, looking at the amount of the standard dividends of some companies, and the size of the war income-tax. Though, in such a state as that of current affairs, sentiment should not be allowed to enter into the question (but the treatment of it should be on the grounds of justice and the preservation of the financial stability of the gas industry), there should be discretion. Therefore, Mr. Valon suggests that probably substantial justice would be done if the standard price were increased in proportion to the net cost of coal —say, as a temporary measure for five years. We cannot, of course, hope to get to any mathematically exact accuracy of treatment for all the varied conditions of companies; but even Mr. Valon's suggestion would not meet all cases, where there have been extraordinarily heavy commitments in regard to labour, ship insurances, and other things, which have had remarkable effects. It is a complicated business; but Mr. Valon's suggestion, like others that have been made, would give a measure of relief. Some relief must be obtained. Just as the German reinforced concrete works at the front are being battered down by our guns, so the financial reputation of the gas industry is being seriously battered by the force of present conditions. Recovery will be a long job, unless the industry can show it has men who can handle such a serious emergency as the present one. For the reason that we are more hopeful to-day than before, we will not discuss the last paragraph of our correspondent's article.

A Contrast.

THE gas industry at home has war difficulties of, to it, unprecedented intensity and obduracy; but it has something for which to be thankful in that they are not equal in either respect to those existing on the Continent—especially in the countries at war with us. We have made no secret of the troubles with which the British gas industry has had and still has to contend. Through our columns, they are as well known to members of the German gas profession who are able to secure copies of the "JOURNAL" through neutral countries as are those of Germany to the British gas profession through the information gleaned by us from German papers. We have lately published a mass of interesting matter referring to the straits in which the German gas industry finds itself. These straits have much the same origin as have the difficulties here; but their effects, through various causes, are more onerous—partly owing to the more exacting decrees of official despots, whose exercise of powers and manner of dealing with the conveniences of the community are exactly consonant with what one would expect from the training and example of martinets. Reading what has happened in Germany, including the graphic description of the occurrences by Herr Hase, of Lubeck, in his Presidential Address to the German Association of Gas and Water Engineers (as recently published in the "JOURNAL"), his ameliorating statement that "the ill-effects of the war on the "gas industry have been more marked abroad, especially "in the countries at war with Germany, than at home," is particularly hollow, and at variance with his stated facts, preceding and succeeding.

The statement may apply to our Allies—France, Italy, and Russia—in varying degree; but, in contrast with Great Britain, Germany's gas difficulties are supremely heavy. "Our chief enemy," so Herr Hase has the courtesy to call Great Britain and Ireland, has suffered privations in its gas industry—shortage of material, high prices, and serious wages struggles. It would do our German critic's eyesight a vast amount of good to see the coal stock preparations on many of our gas-works for the coming winter's operations; and at no time has there been the really serious trouble, and the like inattention on the part of the authorities to the requirements of the gas undertakings in this country that are depicted in the German Presidential Address, the report of the Council of the Association, and other sources of information. We do not deny difficulties with supply; but we do deny that they have been in any way on the same plane as those of German undertakings. The prices for coal, too, have been high; but the height has more to do with location and consequent carriage than to anything else. Herr Hase conveniently overlooked the fact that the Price of Coal Limitation Act gives the colliery proprietors 4s. more per ton than the contract prices arranged in 1913-14, and that it is the seaborne coal, through the rates of freight, that costs such high figures when delivered in the South of England. We have no coal-tax here the same as is the case in Germany; none of our gas-works have had to close-down through shortness of coal supply; there have been no restrictions placed upon the consumption of gas; and in London we have no such charges as are about to be made in Berlin—charges equal to 4s. 6d. to 5s. 8d. per 1000 c.ft., and to the small consumers 5s. 1d. Then in reference to wages difficulties, they have been chiefly in the North, among the municipal undertakings; but arbitration has composed them. We do not deny that there have been and are difficulties; and we have never minimized them. But we do assert that, out of the mouths of the bitterly complaining gas engineers of Germany, together with the published facts, there is plenty of witness to the difficulties of German gas undertakings being immeasurably greater than our own, despite the allegation of Herr Hase through ill-information.

At the same time, there are features in common in the difficulties of British and German gas undertakings. Transport troubles are great. The ash content of the coal is such that less gas and secondary products are yielded per ton, and the coke is not of such acceptable quality as would be preferred. The extraordinary ash content increases labour, and diminishes carbonizing capacity and efficiency. This is all a reflection of the conditions in this country. But there has been a burst of indignation in Germany against the official ordinance that consumers must diminish their use of gas by 20 p.ct. compared with last year, accompanied for any default in the way of excess by a first charge of 14s. 2d. per 1000 c.ft.; and for a second contravention of this and several other stipulations, there will be a fine not exceeding £500. The German gas engineers are filled with disappointment and bitterness against this. If only the coal were supplied, they could meet all demands. They see reasons why coal supplied to them instead of to other people would effect an all-round economy. They are much incensed at the ignorance of official controlling authority, which does not know or appreciate that, with the small thermal efficiency of the household stove, a transfer of coal from it to the gas-works would result in a thermal economy through the provision of gas and coke, and hence a saving in the carriage of coal. They are annoyed at the fact that the compulsory reduction of gas consumption applies to heating as well as to lighting; and so are the public and the public press. Next winter is not being approached with any feelings of confidence and pleasure by the public, who, now that there is restriction in the use of gas, appreciate more than they ever did before what a valuable, friendly, and convenient agent it is to them. They would suffer reduction of lighting with equanimity, but to take away gas for cooking and heating is as great a deprivation as restriction would be in the supply of lager beer. All the arguments gas engineers can bring to bear on the position have been brought. Herr Korting thinks the supply of coal of which gas-works are deficient could be drawn from the coke-ovens. Other men point to the economical handling of coal by the mechanical plant of gas-works compared with its house-to-house distribution for grate use, and to the ease of gas distribution by pipes, which saves labour, as well as helps to preserve the road surfaces. But German officialism is relentless; its determinations require a more stringent solvent than practical argument. New gas connections are also prohibited, except in certain instances, unless consent can be secured. The German gas industry is under a baneful subjection, unequalled (albeit that Herr Hase says otherwise) by the regulation of the gas industry in any other country now at war, and least of all by that of the gas undertakings of the so-described "chief "enemy." In one thing we are firmly in agreement with Herr Hase—in his expression of confidence in the future of the gas industry after the war. The foundations have not

been in the least injured by the international eruption; as a matter of fact, they have been strengthened by the war. What is wrong at the present time is that the industry is working under fictitious conditions; and until they are removed there can be no certain registration of actual progress. But greater progress and greater usefulness will come to the gas industry as sure as day follows the night.

And the night is one that has been made blacker by the dastardly initiation and deeds of the Germans, which Herr Hase applauds, and in which initiation and deeds he has a profound and tranquil faith born of false report. He believes that the German submarines and aircraft—roaming hidden under the water or flying thousands of feet in the air—with their records of murder and maiming of civilians, including women and children, and the destruction of homes, will attain the object and produce what he, in his innocence of the villainy of Prussian Militarism, chooses to describe as a "just retribution." That is war as made in Germany; and there are Germans who are proud of it! We cannot, however, believe that human feeling is so dead among all Germans that, knowing the truth of the foulness of which Prussianism is guilty—foulness embracing the sinking of hospital ships, and now the bombing of hospitals in which helpless men are lying—they would defend such vile actions as Herr Hase has—we hope unwittingly—done. He may continue to rail at the "Journal" to his heart's content. We care not. The "Journal" represents an industry with men at the war, and with men on unarmed ships that have been torpedoed by German war vessels, and an industry supplying homes that have suffered heavily from the merciless bombs of German scattering. Herr Hase may glory in all this. Germany's barbaric deeds have made not Herr Hase, but the civilized nations of the world stand aghast, and have aroused them to the work of compelling the observance of laws of human and higher creation. When Germans again emerge into the outer world, and come once more upon the tide of human affairs, they will find the scorn of the world and the brand of a deep degradation upon them. The outer world is in a position to judge; the misinformed German nation is not. When it is—when the history of this war with all its detail of horror of Prussian genesis is told—if hatred does not blind the eyes and subvert reason, many there will be in Germany who will wish they could turn and rend those who have been the means of dragging down the name and the reputation of their Fatherland into such a depth of the filthiest of mire. Judgment upon these matters fortunately does not to-day rest in Germany alone. This should be remembered when the President of the German Association is tempted to denounce the considered judgment not of a single observer and writer, but of vast countries and millions of people of freedom, of ripe intelligence, and withal possessed of the truth.

"The Time has Fully Come."

For a long time past, as Mr. J. Mogford, of Briton Ferry, acknowledges in the Presidential Address that he delivered last week to the Welsh Institution of Gas Engineers and Managers, we have emphasized the importance of the gas industry making a real organized move to shape the course of its practices and work generally to the demands of the times, and to meet with a bold front the plans of the competitors, which are right and proper in their own interests and in endeavouring to better serve the national economy. Complacency with development without any special effort is an evil appertaining to the gas industry which must be combated. There are, as we have pointed out before, committees at work, and schemes maturing, within the electricity supply industry, each and all having for their object an enhanced economy and efficiency; and every additional success to this end means a lower price and so increased ability in competition. We are by no means alarmists; but let the men responsible for the industry's development and advance have their eyes wide open to the facts that are before us, and not allow the great advantages the industry possesses to lie dormant, and no endeavour be made to reap from them the highest possible profit. It is very difficult to say precisely to what are due the complacency and want of visible energy in the gas supply industry in this matter of organized effort and deliberate aim, apart from individual action. Is it owing to something of a traditional nature that has come down to these times from days when the gas industry had practically no competitor? Is it due to the fact that the gas industry has largely relied for meeting competition on adventitious circumstances coming to its aid just when most needed—such as the invention of the incandescent mantle? Is it owing to the gas supply industry leaving the means of its advance so largely, and with such complete confidence, to the manufacturers of gas lighting, heating, and power appliances? Is it due to the fact that it is felt there is an unassailable security in the gas industry's operations being established on the utilization of coal in the best of current utilitarian modes? If not to any of these things, then to what are the complacency and want of internal organized effort due? The attitude, any way, has lost (if it ever had any) all strength and reason. The circumstances developing about the industry include the fact that the competitors are organizing, investigating, and planning. What they are doing will be brought against the gas industry with all its force; and we shall find our weaknesses exposed to the attack, and all owing to an indifference to what is happening at our very doors.

The position has not escaped Mr. Mogford. We wish its significance had not escaped many other men in the gas industry. Then, although better far would have been an earlier organized movement, they would have arrived at the conclusion that "the time has fully come when the "supply of light, heat, and power to an industrial district "[we submit to all districts] should, in the interest of the "trade of the nation, be obtained by the destructive distilla-"tion of coal, the recovery of its valuable bye-products, "the complete gasification of such of the residue as is not "required for metallurgical purposes, the distribution of "gas of such composition as investigation shall prove to be "most suitable for general purposes, and the distribution "of electricity generated by means of internal combustion "engines." That, in effect, is just what we have long been preaching. We know there have been from some quarters suggestions of an undue view of the position. Very well. Let us reply by asking, and so pointing a moral, what has made the present war so long? There is only one answer: The unpreparedness for war of the Allies against the preparedness of Germany. How was it Germany overran, at the beginning of the war, such large tracts of the territory of the weaker nations? Why is it we have now the work before us of forcing Germany back over that territory yard by yard? The same unpreparedness. The gas industry must organize and plan to meet the new circumstances with which it will have to contend. It has no definite policy; no plan of campaign; and is there any evidence it is anybody's business to go seriously into the matter? The Gas Components Committee of the Institution of Gas Engineers and the Leeds University are at work, or preparing for work. But what else is being done? The industry is leaning heavily and hopefully upon the Board of Fuel Research. Self-help is a more worthy condition. Reliance upon others may lead to disappointment, and disadvantage where advantage was expected.

We leave Mr. Mogford's address to speak further for itself on these matters. It is worth reading. It is a statement by one who has thought; by one who sees danger ahead with inaction continuing on our side; by one who sees possibilities everywhere, with his eyes on a concrete scheme for Wales in the shape of linking-up, consolidation, and a widespread service; and by one who does not appreciate the gas industry being oppressed as it is to-day to an extent that its capital is not earning, and is certainly not receiving, anything approaching a fair average return—partly through the injustice of government controlled prices, and partly through the normal working of the sliding-scale in abnormal circumstances and under abnormal conditions. Yet, we read "an industry whose operations are essential "for the defence of the realm, and whose products are "equally as important in times of peace, must of necessity "be a valuable national asset." The "valuable national "asset" is not allowed its just reward; its administrators are leaving it much to others to shape its future course; and the while we talk finely regarding its large opportunities. "The time has fully come" when a vigorous organized movement should be made the same as in other industries for purposes of defence and progress.

We are glad to see that the Welsh Institution have had under consideration the question of founding co-operative tar distilleries; also the suggestion of the President in respect of a similar arrangement being applied to the utilization of ammoniacal liquor. The smaller works have too long been the victims of a condition of things in regard

to their secondary liquid products which should be terminated. There are, of course, difficulties in co-operative tar distilling, or the working-up of ammoniacal liquor; but to business men these difficulties should not be beyond negotiation. The best plan, of course, would be co-operative distillation through a neighbouring large gas-works; but failing that joint enterprise. If tar distillation is a paying business for the distiller outside the gas-making industry, it should be likewise for a large gas-works and its immediate smaller neighbours. There are economies in transport all to the good of co-operative working, and a power of control that under current circumstances is simply handed over to those who do not produce tar, but who advantage themselves considerably at the expense of those who do. Mr. Mogford would like to see a simple means for the direct manufacture of sulphate of ammonia which could be adopted without purifier troubles. The recent discussion of this question by Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, leads us to hope that the difficulties are amenable to control, though there is not satisfaction yet that the direct system under gas-works conditions can be raised to the make per ton efficiency of the old system, though this is in some works deprived of much credit by the lack of supervision. However, these matters of detail in general operations all point to the one fact, that there is infinite work to be done in advancing the interests of the gas industry.

The Showroom and Economical Appliances.

ALTHOUGH some gas undertakings are at their wits' end as to how to keep pace with orders for new connections through present well-known causes, and the managements of some others are declining to jeopardize the supply to existing consumers by fixing additional apparatus, at the same time there is wisdom in the effort to keep the public well informed as to what can be done when opportunity again offers. No more than can be helped, people must not be allowed to think that the war has put the gas industry into a somnolent condition. One means of demonstrating that vigour is as great as ever, and that it is only war-produced lack of means that limits the exercise of energy, is by maintaining the showroom at the highest possible degree of efficiency. Therefore even though war time has imposed restrictions on business, the brief survey of what a showroom should be like that Mr. W. H. Cattell, the Chief Salesman of the Swansea Gas Company, made at the Welsh Institution meeting last week, is not at all inopportune. We have only to ask ourselves what are the objects of a showroom; and, if there is no lack of imagination, the answer will be the first stage in the constructive piece of work that shall serve these objects. The drab shoplike character of the old-time showroom where it still exists, it must be confessed, is an excellent testimonial to managerial unprogressiveness. The showroom of to-day should be a place of silent temptation, by the object-lessons it conveys, and which object-lessons should be varied from time to time—at any rate, in the windows. Mr. Cattell modestly tenders a number of sound principles as to what should be the mission of the showroom, and advice as to how to carry them out. Smart window dressing, with changes at fairly frequent periods, and means for demonstrating appearance and use, are requisite. Everything should show how far practices are to-day from the crude usages of the past, and how gas means progress in our everyday affairs. People, too, should be made to see the over-all economy arising from the use of gas. It must be remembered that there are other methods of lighting, heating, cooking, and power, which to the eye are equally attractive; but the public do not always understand that between attractive objects the relative economy may be as wide asunder as the poles.

In considering the showroom, there is another matter that should not be overlooked. It is that all people's pockets are not lined alike; so that, while highly finished appliances in richly appointed settings are on view, the householder of moderate means must see that his needs can be catered for equally well. The counsel Mr. Cattell gives as to letting householders know to the last penny what a job will cost them, so that their full obligation is discharged within that price, is a good one, as is also the advice that every gas undertaking should on its own account put to test the gas appliances offered to them so that they may recommend with a clear conscience. At Swansea, testing is carried out in order to give would-be users exact information, and to guard the Company's own interests. If people, for instance, consult the Swansea Gas Company's officials, they will not adopt the "Multi-"Cooker," which was at one time much advertised, then there was a quieting-down for a time, with latterly a fresh outburst on a more modest scale. In the new advertisements, so far as we have seen them, mention of a fanciful percentage saving of gas has been dropped. The challenge of the British Commercial Gas Association to substantiate the figure, has probably made the "Multi-Cooker" people rather more discreet. The tests that have been made at Swansea show that, instead of a percentage saving, there are good percentage losses in both gas and time, and the mode of "saving" necessitates a higher pressure of gas, or probably the work would require still more time to accomplish. The manufacturers of ordinary gas-cookers will notice that still higher efficiency is looked for at Swansea, which means that what the manufacturers have already done towards the improvement of cookers is not regarded as the ultimate possible efficiency. We should like to see the manufacturers all working hard to improve both the efficiency of the oven and the hot-plate. Whether external heating or internal heating of the oven is coming out top in this matter, time and development alone must show. But the more efficient hot-plate is badly wanted for the domestic cooker; for, though B.Th.U. may be cheap with gas, prodigal use discounts the cheapness.

The Activities of the National Gas Council.

After the editorials were in type this week treating of the need for immediate co-operative action for the advancement of the gas industry, and commenting upon the question of the sliding-scale, we incidentally learned that the Utilization of Fuel Resources Committee of the National Gas Council have lately held quite a number of meetings, and will be reporting presently. To a certain extent, this has a bearing on the various plans for the future of the electricity supply industry—the linking-up schemes, and those proposing the centralization of electricity generating plants, with coal carbonizing and bye-product recovery as the initial process in the work of generation. Economy, together with the questions of coal conservation and the volume of output of bye-products, should forbid that course. The proper place for the carbonization of coal is at those works that are so circumstanced that they can best utilize the products derived from coal carbonization, and these works are, without doubt, those that already have direct dealings with the public—domestic and industrial, in the matter of gas supply and the provision of other products for industrial operations. If consolidation is economically correct in respect of electricity generation, it is the same, within certain territorial boundaries, for coal carbonization; and no argument is required to support the proposition that, given a larger sphere of action in the matter of coal carbonization, the gas industry will be able to serve the community with gas and the industries of the country with its products generally on more economical terms than is possible under its present local restrictions. The Utilization of Fuel Resources Committee are, we understand, hard at work in this direction. As to the sliding-scale, the Council have a strong Committee going into the matter. They have lately met, and considered a large amount of information that has been collected, sifted, and co-ordinated. The whole subject will be discussed very shortly. It is to be hoped the question will be pushed forward with the utmost speed. There is pressing need for action for the reasons already advanced in several articles that have appeared in our columns.

A Benzol Producers' Committee.

From time to time in papers and articles that have been published, suggestions have been made that a Benzol Association should be formed for the purpose of protecting producers after the war, and assisting in opening-up, in a proper way, the channels of permanent business after the requirements for war purposes have been finally satisfied. A strong Committee of producers has been formed for guarding the future interests of the business. The Committee embodies representatives of gas undertakings, coke-oven owners, and tar distillers. Various schemes were suggested at a meeting held in connection with this movement at the Gas Light and Coke Company's offices; and the Committee will be almost immediately getting to work to consider the various

proposals. They are not taking action any too soon. The colossal oil companies have their eyes on the situation as it affects them. They do not want anything to happen that will in any way assail their control of the motor spirit market; and at intervals there have been indications that they were considering how best they could secure control of this competitor which is going to influence the petrol position in the motor world. As a matter of fact, there will be room for all; and one of the most important questions for the Benzol Committee to decide will be whether they should ally themselves with one or other of the great petrol companies or keep themselves entirely clear of any linking-up scheme. At any rate, the motor-car and dye industries, as well as users, will be (or should be) profoundly obliged to the benzol producers if they maintain an independence of the huge oil interests.

The Coal Factors' Portion.

In the issue of the "Journal" for Sept. 11, we reproduced the order of the Coal Controller regarding the scale of charges per ton in excess of pit-head prices that coal factors and merchants may charge to certain purchasers. The scale is giving greater dissatisfaction to those placed under the higher charges; and in the gas industry the question is being asked why, if 3d. per ton is a correct excess charge for coal supplied through coal factors to railway companies, three times that sum should be considered to be a correct one for the gas industry. And further it is asked why munition works, at which large profits are being made, should only have, as payment to the coal factors, 6d. per ton put upon them, while gas-works, which are also essential munition works in a very considerable way, should have to pay 9d. per ton. We can understand that gas companies can offer facilities for the transit of coal, but do not see that their conditions as consumers or anything else will justify such a large percentage difference between them and other works; nor, in view of what the gas industry is doing for the country, with controlled prices for several of its products, is there any sound reason for the disparity between it and other munition works. We shall not be surprised to hear that representations regarding the matter will be made to the Coal Controller.

A Federation of Gas Engineers.

A suggestion is made by a correspondent [see p. 555] that the position of affairs in the gas industry would be greatly aided by a Federation of Gas Engineers, to be operated under a Board elected annually. The suggestion, we are afraid, has come too late, as a very general opinion in the gas industry is that any development in organization now must include all interests—financial, engineering, chemical, and commercial; and the National Gas Council is the organization *pro tem.* through which and by which, it is hoped, the fuller representative body will be brought into being. On the National Gas Council, the Institution of Gas Engineers have a good representation; and some of the very work that it is proposed by our correspondent should be done by the Federation is now in the hands of the National Gas Council and the Commercial Sections of the District Gas Associations. We are confident that Government Departments who at one time became sickened of the number of organizations in the gas industry that approached them, and which number always placed them in a quandary as to which one they ought to consult, would—now that they do all their discussion and consultation through the National Gas Council—be prepared, with memories of the past still vivid, to give the cold shoulder to a Federation of Gas Engineers. It must not be forgotten, too, that the National Gas Council includes gas administrators; and we are more than a little bit doubtful as to the reception that would be given by them to a proposal by their own engineers to form a body among themselves to usurp the powers of the National Council. Matters have advanced too far for such a recession in the industry's policy.

Man Power Reorganization.

The other day Sir Auckland C. Geddes, the new Minister of National Service, outlined to a deputation his scheme for the reorganization of the work of the department. He has not sufficiently far advanced to give any more than a vague idea of the details of the new scheme; but he said enough to show that the intangible policy of the past, which, instead of organizing national service, has brought it to a condition of chaos, is to be placed on a well-considered, and what we hope and believe will prove to be a more effective, basis. It should be said that the fact that the late Minister did not succeed was not due to personal shortcomings, but to the impossible restrictions under which he had to work. The gas industry, among others, has felt acutely the muddled influences that have been operating; and no industry will be more thankful than it to have its man power, other than the part which comes under protection through the Ministry of Munitions, put on a proper footing. Of course, at the beginning of the war, the calling-up of men for service in the field was an urgent matter, and had to be done hurriedly, with the result that the most active and energetic men were first drawn from industry generally. But the strange thing happened. The years have passed without any efficient systematic plan being devised for dealing with this important question, with an eye to maintaining a good balance between the requirements of the army and navy and those of the industries and trading of the country. Sir Auckland Geddes realizes the complicated task that he has taken in hand; but he hopes that the reformed department, of which he is the head, will be able, without attempting to work miracles, to get the problem of man power under fair solution, and to wipe out abuses.

The Scheme in Broad Outline.

Sir Auckland is departmentalizing the Ministry, each department having its own particular sphere of work. Information is going to be collected from every available source and studied; but absolutely nothing can be done before the confusion is intelligently straightened out, and a clear view is obtained of the labour needs of the country. Exact information is going to be collected as to the immediate and prospective demands for men in the country to carry out the programme of the Government war departments. The Committee which will have this work in hand will have the powers of a National Priority Committee; but—this our readers will be interested in learning—the Committee will not interfere within the sphere of the Ministry of Munitions. At the same time, the orders resulting from the work of the Priority Committee of the Ministry of Munitions will go out from the Ministry of National Service. Sir Auckland has come to a very definite conclusion—that it is impossible to clear all the younger men out of the industries, and leave only the older men in them. He believes that, for work behind the lines, men of 40 years and upwards could take the place of younger men. The former, in his opinion, would have a steadying influence upon the latter. In the works at home, too, he thinks, very real difficulties would arise if they withdrew all the young men, or too many of the older men. It is essential, and this is at the base of his policy, that there should be a fair proportion of middle age and youth left to do the work of the country, and a healthy balance must be created. There will be good confidence in leaving matters to one who holds such enlightened and practical views as those to which Sir A. Geddes has given voice. The country has got more than tired of the everlasting uncertainty of indecision and inexact rule.

The Needs of Gas Lighting.

An address reawakening thoughts on the subject of gas lighting is that which Mr. W. J. Serrill has made, as President, to the members of the Illuminating Engineering Society of America. It is now some few years ago that Mr. Charles Carpenter, D.Sc., was reminding his colleagues that gas lighting continued to be the backbone of the gas industry's business, and that uniformity of gas composition, freed from deleterious constituents, and consistency of pressure were all-important in the defence of this part of their trading. In respect of lighting, more than in any other branch of the industry's business, we are on the defensive; and we must not forget this. But with the abandonment of the illuminating standard and the enthronement of the calorific one, there should not be the same difficulty now in maintaining uniformity of composition, which is a great gain. The use of a mixture of coal gas and water gas imposes an obligation in respect of supervision which again presents no insuperable difficulty, providing a proportion of coal and water gas plant is provided that will enable a constant mixture of coal and water gas to be distributed despite seasonal variations. When Mr. Serrill speaks of water gas, he has, of course, in mind carburetted water gas; and the oil is an additional factor demanding oversight to maintain uniform conditions. With blue water gas (properly made), a gas is given that, providing the correct proportions are maintained, rather

contributes to, than detracts from, flame temperature, which is the condition for incandescent gas lighting. There is, too, a smaller amount of condensable hydrocarbons in the gas, which all contributes to the maintenance of uniform constitution. It is well to be reminded by such addresses as that of Mr. Serrill of the correct lines of duty in the matter of not only preserving but developing our lighting business.

Coal and Coke Exports.

Following up our record of the coal, coke, and patent fuel export business, the Board of Trade returns for August show that 3,244,565 tons were sent abroad, or 609,229 tons less than in August, 1915, and 420,917 tons less than in 1916. The total value last month reached the figure of £4,435,867, or £963,877 more than in the corresponding month of 1915, but it was smaller than in August, 1916, by £581,975, when 420,917 tons less were sent out of the country. But coalowners have the consolation of knowing that the average value of the total exports was the same—£1 7s. 4d. per ton. The eight months' exports show a good reduction compared with the corresponding period of the two preceding years, while the values have ascended. The volumes of the exports have been: 1917, 26,101,301 tons; 1916, 27,744,306 tons; 1915, 30,962,900 tons. Values: 1917, £34,893,758; 1916, £33,145,955; 1915, £25,454,699.

PERSONAL.

Lieut.-Col. W. Carmichael Peebles, of the 7th Battalion of the Royal Scots, is home on leave for four weeks, after spending the last fifteen months in Egypt.

Mr. William M'Naughton, the Assistant Manager at the Armadale Gas-Works, West Lothian, has been appointed Assistant to the Works Manager of the Coventry Corporation Gas-Works. He has been five years at Armadale.

A very gratifying item of news was received in London last week—that Lieut.-Col. William R. Glover (before the war the Birmingham representative of Messrs. Glover and Main) has been awarded the Distinguished Service Order.

Mr. John Denham, the Assistant Manager at the Brighouse Corporation Gas-Works, has been appointed Engineer and Manager of the Whitehaven Gas Company. Mr. Denham has been at Brighouse for twenty years. The Corporation have accepted his resignation with expressions of appreciation of his work.

The Directors of the Annfield Plain and District Gas Company have appointed Mr. Walter Frost to the position of Manager and Resident Engineer at Annfield Plain. Mr. W. Frost has been for some years under the Matlock Bath Urban District Council in charge of the Gas and Water Department, as Engineer and Manager. Some twenty years ago, Mr. Frost was appointed foreman at the Matlock Bath Gas-Works. When Mr. W. Jaffrey resigned the position of Manager ten years ago, Mr. Frost was appointed his successor.

During a dinner interval last week, at the works of Messrs. Robert Dempster & Sons, Limited, of Elland, Lance-Corporal Harold Chapman, of the Seaforth Highlanders, a former employee of the firm, and who has gained the Military Medal, was the recipient of a presentation of a gold watch and chain and pocket wallet, the gift of the men employed at the works. The presentation was made, on behalf of the men, by Mr. J. W. Broadhead, the Managing-Director, who congratulated Chapman on what he had done, and wished him a safe return. Hearty cheers were given for the Corporal. Mr. Broadhead, replying to a vote of thanks, mentioned that 95 men had joined the Army from the works, of whom nine had been killed and four wounded.

OBITUARY.

The death has taken place of Mr. George Corry, the Manager of the Belfast Corporation Gas-Stove Department. Mr. Corry was an excellent business man, and was greatly esteemed by the members of the Gas Committee and by the public with whom he was brought into contact.

The death has occurred at Galafoot House of Mr. Francis Scott, Engineer and Manager of the Galashiels Gas Company. Mr. Scott was a son of the late Mr. Alexander Scott, Gas Manager of Galashiels, and was formerly Manager at the gas-works at Tillicoultry and at Kelso. Over twenty years ago he was appointed Assistant to his father at Galashiels.

The death is announced as having taken place on Saturday at Leicester of Sir Edward Wood, who some years ago, in consequence of ill-health, retired from business and public life. He had had a remarkable career, achieving success by his own efforts. He was four times Mayor of Leicester; and it is declared that to his foresight was largely due the fact that the gas supply of the town was municipally owned.

THE NATIONAL GAS COUNCIL AND FUEL OIL SUPPLY.

A Letter from the Ministry of Munitions.

We are informed by Mr. W. J. Smith (the Secretary) that the National Gas Council have received a letter from the Ministry of Munitions which, after explaining the necessity which had arisen at the end of July in respect of fuel oil, goes on to say:

> Unfortunately, in July last, when your Council's memorandum was issued, no data were in existence from which it was possible to ascertain the cost of production of fuel oil obtained by abnormal methods of carbonization; but, owing to the urgency of the situation, we were unwilling to face a postponement of a general appeal to the industry until this information was forthcoming.
>
> The efforts which have been made by the individual undertakings in many parts of the United Kingdom have now established that any additional fuel-oil that can be obtained by abnormal methods of carbonization, can only in exceptional cases be produced at a cost which is not prohibitive. As a consequence, after a series of conferences with the authorities concerned, it has been decided that while every effort should still be made to develop further the home production of fuel oil, its immediate production by abnormal methods of carbonization is not justified by an all-round review of the conditions pertaining to its production and acquirement by the Ministry, except to a very limited extent. Other means are, therefore, being taken to supplement the supply from overseas, though possibly this may be at the expense of other liquid products.
>
> In pursuance of the above decision, this Department is not authorized to continue to press your Council to develop any scheme for adoption by the gas industry as a whole; but it is as desirous as ever of entering into arrangements with individual undertakings which, by variations of their present methods, are able to increase their output of fuel oil at a cost which, though higher than the present cost, can still provide it at a price that can compare with that of other sources of supply.
>
> You will recognize that it is inevitable at times like these that steps are taken which may have to be reconsidered; and it is hoped that the many undertakings which have co-operated so promptly and loyally with us in this matter will not feel aggrieved at this change of policy.
>
> In conclusion, it is asked that your Council will make it known to the industry as a whole how greatly their work in this connection is appreciated, and will itself be assured that the information obtained by so much effort is of the greatest value, and may yet prove essential should future developments, unhappily, prove unfavourable.

In sending this for publication, the Executive Committee desire to point out:

> (1) That this matter was taken up at the urgent request of the Ministry of Munitions, with the object of inducing such works as were found to be in a position to do so to render as much help as possible in the then situation, on the understanding that cost—which it was known would be abnormal—was a matter of quite secondary importance.
>
> (2) That, as was distinctly stated in the memorandum which accompanied the circular letter of the 1st of August, and which was sent out at the instance and with the authority of the Ministry, the work was intended to be undertaken only in "all *standby* plant," and only during such period as it would not interfere with the public demand for gas, as it was fully recognized and pointed out that it would be "impossible for many undertakings to continue this work during the period of maximum demand." It was not proposed to restrict the output of gas by the employment of plant on reduced temperature carbonization of coal where its maximum output of gas was required to meet current demands.
>
> (3) That in various cases where reduced temperatures were adopted at suitable works, the results show an increase in the make of tar per ton of coal, and an even greater percentage increase of the creosote contents of the tar so produced; the reason for the Ministry abandoning the proposition being not impracticability so much as the ascertained cost combined with an unexpected improvement in the oil-fuel situation. In the Ministry's memorandum it is set out that the proposals of the undertakings experimenting in this matter had to be approved by the Ministry; so that the costs involved in these proposals could be checked before the various proposals could be officially accepted.
>
> (4) That day-to-day variations in the needs of the country's fighting forces, and consequent changes in the policy of Government Departments are matters altogether beyond the influence of the Council, which can only loyally respond as far as is practicable to every request made by the Government (whose policy in such matters is naturally, as in this case, based upon the advice of technical experts), especially when representations of such an urgent character are made as were put before the widely representative meeting of gas engineers and administrators held at the end of July.

ELECTRICITY SUPPLY MEMORANDA.

Gossip is frequently dangerous; the "Gossip" that appears in "Electrical Industries" is not immune from this trait. The other week (Sept. 4), some reflections were made in the "Memoranda" upon certain foolish strictures that the writer of the tittle-tattle in our contemporary had penned on the action of the South Metropolitan Gas Company in declining to fix on hire a gas-cooker, in current circumstances, in the house of an electric light user. The critic of the Company has returned to the charge, and shows additional ignorance and inappreciation of the commonsense of the position. He tries to make out that, at all times and in all circumstances, the South Metropolitan Company are foolish enough to refuse to fix cookers in the houses of electric light users. The electricity purveyors should be thankful for such a self-denying method of conducting business in normal times, seeing that it leaves open the field for the entry of the wonderful electrical contrivance that, no matter relative temperature conditions, declines (according to electrical declaration) to waste meat to the same extent as, but costs more to do a corresponding amount of culinary work than, the gas-cooker. Such indifference to its interests on the part of a gas company should be welcomed and blessed by electrical folk; but there is this particular individual heartily reproaching the South Metropolitan Company for doing a good service to the electricity supply industry. The absurdity of his position on that one point needs no further comment. There is another aspect of the matter which also proves the stupidity underlying his arguments. Gas-cookers are far better all-the-year-round gas consumers than a number of incandescent gas-burners, especially in days of summer time daylight saving. A dwelling-house using 5 or 10 c.ft. of gas per hour for lighting is a poor customer compared with a house with only a gas-cooker installed, drawing gas from the holders morning, noon, and night, and not only during the hours of heavy demand for lighting. This being so, where is the sense in rejecting, if it can possibly be avoided, the gas-cooker user, whose consumption would be greater than if he was a consumer of gas for lighting only? Our contemporary's persistence in displaying ignorance over facts is both interesting and amusing. The description we gave of the war time difficulties of gas undertakings is characterized as "pathetic." We fail to see anything "pathetic" in such a plain, straightforward statement of hard facts. He also finds inconsistency between those facts and the advice to householders to use more gas. Our sympathy for such intelligence increases. If he again reads what we had to say a fortnight since, he will see that particular emphasis was laid on the point that the supply circumstances of gas undertakings largely differ in these times. Many of them are in a position to supply more gas to householders with lighting appliances, cookers, gas-fires, and other appliances already fixed; but perhaps these concerns, through labour and gas appliance shortage, are unable to make any new connections. So we may place among the other absurdities of the electrical writer the remark: "The British Commercial Gas Association ought really to protest against the Government adding so cruelly to burdens which are already overwhelming." Our advice to this critic is that he should try to look at matters from all sides, and not from a single one. This is the only method of avoiding the making of such foolish muddles, as many practical electricians who read these notes will confess have been made on this occasion by the writer in "Electrical Industries."

Electrical Arguments and Absurdities.

Uses that were not intended can be made of even a Departmental Committee. Mr. L. W. Woodman, the Electrical Engineer of Dover, has found one such use. He has been employing the appointment of the Board of Trade Electric Power Supply Committee to spur-up his own Committee into taking a larger view of the electrical life, or accept the consequence of electrical extinction for being unfaithful to the fullest possible utilization of their supply functions. Mr. Woodman has told the Corporation that the Board of Trade Committee are going to see that the supply of electricity is adequate and cheap in all districts for manufacturing purposes. The duty of the Corporation and all other corporations is therefore to consider how far they can meet the demands in their districts. If they are not prepared to provide an adequate supply, then Nemesis. Some big absorbing concern may come along, or they may have to take electricity in bulk from a large external power station. The whole point for the Corporation is to protect their interests by action. It seems that three times since early in 1915, the question of additional plant for Dover has been considered, but on each occasion it has been thought better to postpone it. When the matter came before the Committee the other day, the members grasped Mr. Woodman's meaning, which was that the Corporation should say what they were prepared to do after the war, so as to prevent an outside authority coming in, and doing it. Mr. Woodman has got his eyes on the East Kent Power Company, and a proposal to supply Dover from Tilmanstone power station. The Corporation of Dover are like other municipal bodies—do not want to relinquish any of their statutory privileges. They are still, as the Electrical Correspondent of "The Times" would uncharitably say, obsessed more by the retention of municipal privileges than by national interests, which is as may be. There are differences of opinion on the subject. Stimulated by Mr. Woodman's application as a spur of the Departmental Committee, the Corporation have announced that they have under consideration the advisability of extending their undertaking by the erection of another station outside the borough, with a view not only of meeting the needs of the existing area at the present time and in the near future, but to supply a larger area. That is to say, they ask forgiveness for any shortcomings in the past, and promise to do better in the future. They have also some respect for the capital already expended, and fear a detrimental financial result if not allowed to adopt a scheme of development all "on their own." It was not at all a bad idea on the part of Mr. Woodman—he is a good engineer—to stimulate a pronouncement of policy in this way.

How to Spur-up Corporations with Electricity Undertakings.

There is much talk of the economy of the generation of electricity at the pit-head and transmission therefrom; but insufficient comparison has been made as to whether the transmission would be dearer than still clinging to the old railway wagon and transmitting coal. "D. V. M." in the "Electrical Times" once before discussed the question of "Pipe-Lines *v.* Pole-Lines," and reference was made to it in our issue of July 17. He has lately been considering the cognate question of the cost of electrical transmission and the cost of coal transmission by rail. He has taken the trouble to find out the total price of coal and the cost of railway freight and cartage for a few typical electric power stations—not the largest of their kind, nor the smallest. He finds that the average cost of coal per ton delivered is 168d.; and the average cost of rail and cartage, 50·5d. —the latter being 30 p.ct. of the cost of the coal. He asks whether it will pay to replace the 30 p.ct. by (*a*) transporting fuel in some other manner or in some other form? and (*b*) establishing super-stations at the pit-head, and transmitting electrical energy in bulk? He assumes that the rail and road coal transport which costs 50d. per ton corresponds to a long transmission line. This would involve generation at a pressure A, stepping-up to a main line voltage B, and stepping-down to a local high pressure C. Here two sets of transformers and three systems of conductors are involved. What will the total losses be? Assuming a load factor of 30 p.ct. and a fairly good power factor, the losses are likely to be quite 15 p.ct., unless too much money is laid out on the line. Taking a loss of 15 of every 100 units generated at the pit-head, 85 units are delivered on the bus-bars at the other end. A ton of coal, at a 30 p.ct. load factor, corresponds to a production of 1000 units, which means a high efficiency plant, absorbing only 2·24 lbs. of coal per unit, which is magnificent working. He assumes that the cost of the long-distance transmission might be anything over 0·09d. per unit; it could not well be less—in fact, interest and depreciation alone would be about 0·06d. The expense of transmitting the 850 units would, at 0·09d., therefore amount to 76d. To carry the ton of coal, which should produce at the local high efficiency station 1000 units, would cost 50d.; while the cost of transmitting 1000 units from the pit-head would (850 units costing 76d.) cost 90d. In the particular average case chosen, it is cheaper to carry coal than electricity, even at the present high railway rates; and this in itself seems to "D. V. M." to constitute a damning stricture of the electricity transmission scheme. Of course, the comparison is built upon a corresponding generating efficiency; and there are not many local stations that can claim that they would not require more than a ton of coal to generate 1000 units. There are not a few that would be glad if they could generate 500 units per ton.

Cable or Railway Wagon.

But one cannot abstract a question of economy from all else, and say that the result is all profit without any discounts. We will assume that the coal is to be carbonized at the pit-head. The coke too would in part have to be gasified. But coke (with a heating value of say 14,500 B.Th.U. per lb.) is wanted about the country as well as electrical energy, which imparts 3420 B.Th.U. per unit with apparatus (when found) of 100 p.ct. efficiency. We say nothing about those people who have a liking for heat energy in the gaseous form—rendering 500 B.Th.U. and over per cubic foot. Coke, however, occupies in the wagon or ship's hold more room per ton than coal; and so it is preferable for the coke to be produced locally rather than be brought scores or hundreds of miles by rail. Then, if there are these huge carbonizing plants at the pit-head, there will still be the need for the transmission by rail of the liquid products to the chemical factories about the country, unless the chemical factories chose to spend a large amount of capital by moving to the pit-head. Perhaps rather than do this, they will continue to patronise any gas-works that may survive the electrical revolution. But assuming chemical works concentration about the pit-head, there would still be the chemical products to distribute throughout the country, which is largely assisted at the present time by the chemical works themselves being distributed and not concentrated. Another aspect is that, assuming the concentration about the pit-head, many districts about the country would be robbed of their industries; they would be impoverished; and the towns in the already well-revenued colliery districts would become the richer at their expense. It is patent that the question of transmission of coal by rail or energy by cable is not one that can be separated from all other considerations. "D. V. M." doubts

Other Economic Considerations.

the economy of power transmission by wire on figures of his own presenting. Add to his findings other considerations such as we have shown here come into the calculation from the national economy point of view, and electrical energy transmission has to put up a very strong case to succeed.

Gas Production and Transmission in Excelsis.

In his article "D.V.M." asks gas engineers to supply him with the factors to enable him to compare with electrical transmission the cost of compressing and transmitting gas. If gas can be transmitted at high pressures so easily as to make it a commercial proposition—"if gas fuel can be sent out from the pit-head at some such cost per heat unit per mile as that pertaining to petroleum—then the railways are undone, and electricity's fortune is made." We are afraid that experience in this country of high-pressure gas transmission is not great; it is all on a relatively small scale. Gas is sent from Beckton to London by high-pressure mains. Most gas undertakings of any note have their high-pressure boosting systems; many have high-pressure systems for feeding distant outlying areas; and there are the general high-pressure lighting systems. But these are not quite the same thing as "D.V.M." has in mind. He is thinking of higher pressures and long-distance transmission. But, anyway, the work could be done cheaply. With steel mains and welded joints, the losses would be low. The steel mains, compressors at one end, governors at the other, valves here and there for control, and syphons for dealing with any liquid deposition, constitute the equipment. A high-pressure gas system is a simple thing. But for reliable factors we would suggest that he should go to the source whence he obtained his particulars as to the cost of the high-pressure transmission of oil—the United States. There he could get all he wants from the large experience with long-distance natural gas transmission. Over here (as we have no natural gas within sight worth speaking about), while believing in the consolidation of gas production for suitable areas, the balance of economy, taking all things into account, is considered to be not on the side of pit-head carbonization and then transmission of the products, but on that of conveyance by sea or rail of all that coal contains in the concentrated form in which Nature has presented it, and then dealing with it and separating the constituents close to the place of consumption. Nature was very wise; there are some specimens of humanity who do not think much of her wisdom, and would undo it.

Competition for Electric-Cookers.

The Société Générale Italienne d'Electricité Edison evidently do not think the electric-cookers at present on the market are all they should be. They have, so the "Génie Civil" says, opened a prize competition for the construction of an electric cooking outfit of the thermal storage type, designed to consume as little energy as possible, and to spread the daily demand over the longest possible period; the criterion being the ratio between the consumption in KW. hours and the maximum demand in KW. The conditions are that before March 31, 1918, at least three samples shall be submitted, suitable for a family of five or six persons, as well as particulars of smaller and larger sets. The Société Edison has placed 10,000 lire (£400) at the disposal of a Commission for distribution in the form of one or more prizes. The condition, "designed to consume as little energy as possible," will be noted. Work requires a certain amount of heat; the unit of electricity has a value of 3420 B.Th.U.; and the average consumption of coal in this country to obtain the unit is 4½ lbs., or about 75,000 B.Th.U. It can be done for (say) 43,500 B.Th.U.; but it is a question of modern plant. The 4½ lbs. is the average—probably the average is higher at present with the ash and rubbish laden coal now being sent to large consumers, and for which they have to pay exorbitant prices delivered.

Maximum Prices for Tar Products in Switzerland.

According to the "Journal für Gasbeleuchtung," the Swiss Government fixed the following maximum prices for tar and tar products for the month of August last: Distilled or refined tar, in tank wagons, £7 18s. 6d. per ton, increasing to £13 per ton for quantities of less than a single barrel; mixed tar oil, including green oil, £17 9s. 6d. per ton in tank wagons; crude carbolic oil, £18 14s. per ton in tank wagon lots; soft pitch, in wagon loads, £7 18s. 6d. per ton; medium and hard pitch, in wagon loads, £7 14s. 6d. per ton. Appreciably higher prices are in all cases permitted for sales in smaller receptacles than wagons. Prices are for removal from the distillery or gas-works in the buyer's wagons or other receptacles. These prices are stated to be distinctly higher than those hitherto prevailing for all items except crude carbolic oil.

A Committee of the Manchester, Liverpool, and Counties Commercial Motor Users' Association have arranged for a paper to be read on Friday, Oct. 12, at 7 o'clock, in the Midland Hotel, Manchester, by Mr. W. M. Barrett, of the Manchester Corporation Gas Department. The paper will deal with "Coal Gas for Motor Traction;" and it will be illustrated by lantern slides. Non-members of the Association who would like to be present will receive an invitation on addressing the Secretary, Mr. Ellis Green, Cromwell Buildings, Blackfriars Street, Manchester.

THE COAL SUPPLY OF GERMAN GAS-WORKS.

THE market report, dated Aug. 18, which was published in the "Journal für Gasbeleuchtung" of Aug. 25, disclosed some interesting facts as to the conditions subsisting at the time in regard to the coal supply of German gas-works.

The report states that the Imperial Commissioner for the Distribution of Coal, having at last realized the imperative necessity of furnishing gas-works with more coal, had imposed on the coke-oven works a reduction of 6 p.ct. of their June-July output of coke in so far as one month from Aug. 15 last was concerned. This measure, though only provisionally adopted for one month, should set free 200,000 metric tons of coal for the supply of gas-works. How imperative such a measure had become was shown by the fact that, according to our German contemporary's report, at most German gas-works there was then never more than one week's consumption of coal in store, and frequently much less. Thus the gas supply of the towns is at the mercy of the slightest interruption in the delivery of coal. Meantime, according to the orders of the Coal Commissioner, supplies for domestic use are to be put on the same footing as for factories doing war work; while agricultural supplies, under the direction of the Imperial Grain Bureau, are being distributed through the local authorities. Thus overlapping occurs, and some consumers receive double the supply which they should. It remains to be seen whether the collieries can cope with the increased call upon them; but having regard to the natural withdrawal of labour, and the wear and tear of plant, an increase of 10 p.ct. on the previous month's output can scarcely be expected even in the most favourable cases.

The coal market continued to display the same discrepancy between supply and demand. Stocks of coke also were gradually being exhausted; and scarcity of it also was impending. Want of fuel was felt even in South Germany, which had hitherto been given a preference in supply. The Coal Commissioner now, however, promises uniformity in deliveries to all parts of the Empire. An order made by the Commissioner on July 20 prohibited the transport of any gas coke to railway stations outside a radius of 30 kilometres [about 19 miles]. The hope was expressed that this order, as well as the rationing of consumers with gas, may be revoked as a result of a better realization of its import.

COAL FIGURES FOR 1916.

OVER the signature of Mr. W. Walker (Acting Chief Inspector of Mines), there was issued last week Part I. (Divisional Statistics) of the Home Office report on Mines and Quarries for 1916. Some of the figures will be dealt with more fully when Part III. is published.

It is stated that in the twelve months ended December last the total output of coal in the United Kingdom from mines under the Coal Mines Act was 256,348,351 tons. Adding to this 27,015 tons from open quarries, the total output of coal was 256,375,366 tons, against 253,206,081 tons the previous year. There was thus an increase of 3,169,285 tons over 1915, which year showed a decrease compared with 1914 of 12,458,312 tons. Turning to the district inspector's report, it seems that the output under the Coal Mines Act compared with 1913 and 1914 was 7,313,233 tons and 3,565,360 tons less respectively, but was 430,927 tons more than in 1915. If the traffic could have been dealt with, the men could have worked more time, and more coal would have been produced. In the Northern Division the output was 47,270,124 tons, as against 47,030,285 tons for 1915; and the increase would have been more, if the exigencies of shipping had allowed. The number of persons employed at the end of the year was 191,338, as compared with 184,124 twelve months earlier. This increase was mostly accounted for by men returned from the Colours to resume work in the mines, and by a number who having in the early months of the war volunteered to do munition work have since been released for mining. The output of coal and other mineral from coal mines in the Yorkshire and North Midland Division was 68,471,139 tons, and 67,983,983 tons in 1915; the increase in output being thus 487,156 tons, with an additional value, owing to higher market prices, of no less than £9,182,704. The increase in the output of coal amounted to 501,275 tons. The proportion of coal produced by coal-cutting machines was about 11·3 p.ct. of the whole output of the division. The shortage of workers occasioned by the war was reduced from 31,789 at the end of 1915, to 21,539 in 1916.

There was an increase in the number of persons employed in the Lancashire, North Wales, and Ireland Divisions of about 5 p.ct., though there is still a substantial deficiency as compared with 1914. A number of discharged soldiers have returned to their former employment, and there has been an influx of persons from other trades. In spite, however, of this increase in the number of persons employed, there was a reduction in the quantity of coal obtained of 10,762 tons. This reduction, it is said, may be largely accounted for by the fact that the greater proportion of the men who have left the mines for military service are young men who are capable of producing a larger output than the older men who have to some extent replaced them. The total number of persons returned as employed at coal mines in the South Wales Division in 1916 was 214,100, which was an increase over the

preceding year of 11,445 persons, or 5·6 p.ct. The output of coal was 52,080,709 tons, which was an increase of 1,628,109 tons, or 3·2 p.ct., over the preceding year. In the Midland and Southern Division, also, there was an increase of some 4 p.ct. in the number of persons employed. The total output of minerals under the Coal Mines Act was 29,202,297 tons; the increase in the output of coal being 312,569 tons.

The number of mines at work during 1916 under the Coal Mines Act in Great Britain and Ireland was 2847, and of persons employed under and above ground 998,063. In the preceding year there were 2871 mines at work and 953,642 persons employed. Of last year's total, 792,911 males were employed underground.

There were in 1916 accidents which caused 1313 deaths in mines working under the Act, compared with 1297 the previous year. The figure for last year represents a death rate of 1·32 per 1000 persons employed in mines, and of 4·92 from all accidents per 1,000,000 tons of mineral raised.

FEDERATION OF GAS ENGINEERS.

We have received from a correspondent intimately connected with a large firm of gas apparatus constructors the draft of a proposed "Federation of Gas Engineers." In asking for its publication our correspondent desires that his name be not mentioned. In the course of a covering letter, he writes: Your article on "Indirect Profiteering in Coal" is of great interest, and also Mr. John West's suggestion that the gas undertakings should make a united stand against this imposition. May I, therefore, put forward a scheme which I have worked out, and which I believe would be beneficial to the industry in general. The old French proverb, "L'union fait la force," has been proved times without number during the present crisis. Therefore why should the gas industry not arm itself, and unite in a sort of federation, which would have beneficial consequences both during these troubled times and also after the war. Indirectly, I believe that it would also assist the various Government Departments."

PROPOSED FEDERATION OF GAS ENGINEERS.

The Federation would have the object of assisting gas engineers with every detail concerning the industry, and be worked under a board of gas engineers, elected annually at the Institution meeting. The board would sit (say) every month, and consider the various complaints and suggestions brought forward to the Federation.

An office should be attached to the Federation, which would collect various details required to further the interest of the gas industry.

The object of the Federation would be to deal with all instructions from the various Government Departments, and advise the Government Departments on subjects relating to the gas industry—such as coal, tar, benzol, &c.

It would assist those engineers who are in difficulty and require advice as regards difficulties arising in the works, labour, &c.

It would deal with any details that arise and disputes for the good interests of the gas undertaking.

The office attached to the Federation would also collect useful information—such as consumption of coal, prices, &c., manufacture, sales, &c., gas tar, &c., labour employed, prices paid, &c., also difficulties, improvements effected to plants, and experiences from various engineers, and would communicate same to all engineers, through the means of a "Monthly Bulletin."

Such a Federation would bring a closer union among gas engineers, and assist all those who are in difficulty.

The Federation could be made self-supporting, by means of charges (tabulated hereunder), which would enable small undertakings to derive the same benefits as the large ones.

Works producing up to 10 million c.ft. per annum				£1	1	0
From	11 million to	50 million c.ft.		2	2	0
,,	51 ,,	100 ,,		4	4	0
,,	101 ,,	250 ,,		6	6	0
,,	251 ,,	500 ,,		8	8	0
,,	501 ,,	1000 ,,		10	10	0
,,	1001 ,,	upwards		14	14	0

An entrance fee amounting to one year's subscription could be made to overcome the initial capital expenditure.

The marriage took place last Thursday, at St. John's Parish Church, Croydon, of Vivian Desmond Ryan, younger son of Sir Gerald and Lady Ryan, of Hintlesham Hall, Suffolk, to Miss Kathleen Frances Helps, second daughter of Mr. James W. Helps, M.Inst.C.E., of Berisal, Normanton Road, South Croydon.

The half-yearly meeting of the North of England Gas Managers' Association—presided over by Mr. Richard Nelson—will be held at the Gas Office, Newcastle-upon-Tyne, on Saturday, the 6th prox. In addition to the address of the President, Mr. Harold H. Collett, of Leeds, will read a paper dealing with "Some Experiences with Intermittent Verticals." Tea will be served at the close of the meeting.

According to the "Engineer," an American firm has developed an optical pyrometer for works' use in which the luminous radiation from a heated body is balanced against that from a standardized light source. The instrument is designed for measuring temperatures from approximately 1100° Fahr. to the highest known—a screen being employed to reduce the light from bodies having temperatures in excess of 2500°. The instrument is portable, weighing but a few ounces, and can be sighted, it is emphasized, as easily as an opera glass. The case containing the storage battery, rheostat, and milliammeter, employed in connection with the pyrometer, weighs approximately 10 lbs., and is designed to be slung around the neck of the operator.

THE SLIDING-SCALE AND DISAPPEARING DIVIDENDS.

By Arthur Valon, M.Inst.C.E.

The reluctance shown by the chairmen of the larger gas companies to make a definite effort to obtain a revision of the sliding-scale arises, no doubt, from a patriotic preference. They would rather suffer diminished dividends than even appear to draw profit from the necessities of their country. It must, however, be pointed out that they are—mainly, at any rate—men to whom lessened dividends may be inconvenient, but are not calamitous. It is "very otherwise" with the great majority of holders of gas stock and shares in the country generally. For, from the nature of the investment and the action of the auction clauses, the element of speculation which is present in most investments is reduced almost to vanishing point; and the regular, if low, rate of return on money invested makes a strong appeal to those small investors to whom safety and regularity are essential, because upon them depends their daily bread.

A continuation of the present conditions means the certain destruction of this reputation, and a consequent reduction in the numbers of the investing clients; while, in any case, present experiences are bound to react unfavourably on the popularity of investment in sliding-scale companies. The effect on the cost of raising gas capital in the future is easily foreseen. With Government stock at 5¼ p.ct., and the large demand for capital for industrial purposes inevitable so soon as the war ends, the prospect for gas companies is none too encouraging. It is, therefore, an insufficient reason for inaction that, in some cases, the warm glow of conscious altruism should be considered a sufficient return for financial sacrifice.

The sliding-scale has been so widely adopted among gas companies that its general working is well understood; and that its equitable working depends upon a fair standard price, will be conceded. The methods, however, by which a standard price is fixed appear frequently to be misapprehended. As one who has assisted in fixing many standard prices, I shall risk the charge of engaging in a work of supererogation, and set out the principles in accordance with my experience.

When a company applies to Parliament for a sliding-scale, it has usually been working for some years with a maximum dividend, and generally has paid a maximum dividend of 10 p.ct. on its original shares. To pay this dividend under the economic and industrial conditions at the time, it is necessary to charge a certain price for the gas sold to ordinary consumers; and it is this price which is the true standard price—the previous maximum dividend being made a standard dividend. In many cases a small margin is allowed, and the standard price is fixed a little higher than it would be on the foregoing principles. This is in order to cover what may be termed normal fluctuations in the market price of materials and labour. It is not intended, and it would clearly be totally inadequate, to cover a land-slide in economic conditions.

Now if this process is considered, it will be seen that the standard price is fixed to cover the normal cost of supplying gas, including a dividend at the standard rate; and it is so fixed in order to give the company a reward for good management, so that, if by economy the cost of supply can be reduced, the shareholders may be allowed to divide an increased dividend.

One frequently hears it stated that the standard price must not be interfered with, because it is the result of a parliamentary bargain. Frankly, I do not understand the exact sense in which this term is used. The real parliamentary bargain is the bargain between the authorities and the company, that the company shall exercise every economy, and the authorities will then allow them to increase the dividend beyond the standard dividend. If it is meant that the standard price is fixed by a bargain between the promoters and the opponents of the Bill, it is an inaccurate statement, except possibly in regard to a small number of special cases. It may be that the promoters and opponents differ as to what the standard price should be; but they do not differ as to the principles upon which it should be fixed.

It will be seen that the base factors of the standard price are:

Net cost of coal,
Cost of labour,
Cost of capital.

For the purpose of the standard price, these factors are looked upon as fixed, except for small market fluctuations. If the company can reduce the cost of gas by due care and management—by, for instance, the introduction of more economical plant, or by more economical methods of working, in short, by more efficient management—this will entitle them to increase the dividend. If, however, economic conditions alter, so that the price of coal increases (say) 50 p.ct., and the wages of labour proportionately, it is clear that the company are robbed of their dividend by circumstances not under their control, and which could not be prevented by due care and management.

Take a company which had a standard price of 3s., and had by economy reduced the price of gas to 2s. 6d., and were paying an increased dividend. The economic conditions change, and the price of coal and labour goes up, so that in order to cover these it is necessary to increase the price of gas to 3s. 6d. It will be observed that the whole reward of the company for its improved management has been swept away, and in addition it has

to reduce its dividend below the standard dividend—*i.e.*, below the dividend which it would have been able to pay under the old maximum price. If there ever was a parliamentary bargain, it is pretty clear, in these circumstances, that while the company have still got to fulfil their part of the bargain of carrying out their work with every economy, the reward which is the other side of the bargain has disappeared altogether—indeed, become a minus quantity.

It is also evident that, had the cost of labour and coal been at their present level at the time when the standard price was fixed, this price would have been not 3s. but 4s.; and, in strict equity, the price should be altered to that figure. It has, however, been suggested that it would be impolitic to demand an alteration in the standard price which would permit of the pre-war rate of dividend. There is some force in this contention, but purely as a matter of sentiment. The value of capital has gone up; and where it has been possible to increase the price of an article to give the new rate of return on capital, it has been done. In the case of gas companies, even if they were allowed to pay the pre-war rate of dividend, they would only be dividing the lower pre-war market rate of money by the action of the auction clauses. This must always be considered in relation to the sliding scale, and is a most material point.

When capital is issued by a company paying a dividend higher than the standard dividend, the premium paid by the investor brings the actual dividend paid by the company to that investor down to the market rate at the time of investment. The real standard rate of dividend for the investor is not the nominal standard dividend fixed by Parliament, but the actual dividend at the time of investment; and the real standard price the price of gas which allows this dividend to be paid. Previous to the war, the market rate was round about 5 p.ct., and provided an investor continued to obtain that he had not much to grumble at. But when this comes down by the action of the sliding-scale, it is no consolation to him to say that the company is still paying its standard dividend. And it is for this reason that the proposal that has been made, that the company should be allowed to pay up to its standard dividend, would not meet the requirements of elementary justice.

For instance, with one company which has an old standard price (fixed years ago) of 4s., the actual pre-war price of gas being 2s. 6d., which has been increased by 1s. up to 3s. 6d., the dividend paid is still in excess of the standard dividend. Another company has a standard price of 3s., and has never reduced the price of gas below this figure, but has had to increase it to 4s. to meet increased costs. It is clear that if the latter company were allowed to pay its standard dividend, there is no loss at all; whereas in the former case there is a very serious one.

Although it is easy to show that any cast-iron proposal of this sort will not give equal justice to all, it is not so easy to suggest any simple method by which this desirable result can be obtained. The examination of accounts of the companies principally affected will show that the greater part of the increase in cost is due to an increase in net cost of coal and oil. There have, of course, been serious increases in other items, but they have been minimized by reductions in maintenance charges and in other ways. Probably therefore substantial justice would be done if the standard price were increased in proportion to the net cost of coal. While there are many objections to a moveable standard price, these would probably not be insuperable for a temporary measure—say, for five years.

As to the method by which the alteration can be effected, it is strange that it does not seem to have occurred to the people most concerned, that the whole difficulty has arisen owing to what has become an inequitable provision in various Private Acts of Parliament. The obvious and ordinary way of dealing with such a matter is to apply to Parliament for a revision of the standard price. It hardly seems probable that Parliament will refuse to consider the matter; and the case is so strong that it would not seem possible that no relief would be afforded. The cost of such an application is hardly worth serious consideration if the relief sought is likely to be obtained. Time, however, is passing, and if everybody continues to wait for somebody else to begin, or for some *Deus ex machina* to confer the wished-for boon, nothing is likely to happen, except that the present conditions, or worse, will be prolonged for another two years at least.

Calorific Standard Application and Orders.—An application under the Gas (Standard of Calorific Power) Act, 1916, has been made to the Board of Trade by the Gosport Gas and Coke Company; the power proposed being 500 B.Th.U. Orders have been made by the Board for the Barnet District Gas and Water Company and the Sittingbourne District Gas Company.

Bronze Medal in "Gas Supply."—The Bronze Medal for the Ordinary Grade in "Gas Supply" given by the City and Guilds Institute has been awarded to Mr. Percy Marsland, with the Longwood and Slaithwaite Gas Company. Mr. Marsland is serving articles to Mr. J. H. Brearley, the Engineer to the Company. He received his tuition in "Gas Supply" at the Huddersfield Technical College; the teacher of the class being Mr. E. L. Oughton, the Sales Manager and Distribution Superintendent of the Longwood and Slaithwaite Company. Mr. Marsland is a son of the late Mr. John S. Marsland, who, at the time of his death, was the Managing-Director of Messrs. Drakes, Ltd., of Halifax.

SIXTY YEARS AGO.

From the "Journal" of September, 1857.

Early Comparisons of Cost.—There is an important paper by M. Edmond Becquerel upon the electric light, in which that distinguished French *savant* attempts, we believe for the first time, to institute a comparison between the relative cost of that system of illumination and those at present in general use. The well-known ability of the author entitles his opinion on this subject to our respect; but we are nevertheless unable, for many reasons, to give our assent to his conclusions with regard to the comparative cost of equal lights from gas and from electricity. M. Becquerel himself admits that the figures he gives are not quite correct, because in estimating the cost of the electric light, only the materials consumed are charged; whereas the prices he quotes for gas, which are those at which the Paris Gas Company supply the public lights and their private consumers, include the whole expenses of manufacture and distribution, as well as interest on the capital employed, and a sinking fund for its reimbursement. The cost of the electric light is consequently underrated, while that of the gas is exaggerated. But a far greater error lies in the mode by which the luminiferous value of the two agents was determined. To compare an electric light of 350-candle intensity with an ordinary gas-burner of perhaps one-thirtieth part of that power, and thence to deduce the relative illuminating power of the two agents, is to place the gas at an immense disadvantage. It is easy to construct a burner, by which a sufficient quantity of gas may be perfectly consumed, to yield a light equal to the electric light. Mr. Gurney's "Bude light," and the Liverpool "Sun burner," are examples of what may be done in this respect.

Manure from Coke and Gas Liquor.—Having noticed the remarks in your "JOURNAL" relative to the unsaleable coke in different gas-works causing much loss, I beg to suggest that, by pulverizing it, and impregnating it with gas-water, it might be made into a valuable manure; the ammonia in the gas-water being fixed by sulphuric acid, &c. When sold to the farmer, in the above prepared state, it would be found very valuable for his grass lands, cereal crops, and his turnips, when drilled-in with the seeds; having myself found by experience that Boghead charcoal and soil, impregnated with gas-water, and sown broadcast on the land, conduces to a healthy growth of vegetation. By the use of gas-water, the artificial manure manufacturer increases the value and fertilizing properties of his manure; and in the above simple use of coke, impregnated with gas-water, the necessity of diluting the latter with water, and then putting it on the land with a watering-cart, is done away with, at the same time that the strength of the gas-water does not check the growth of vegetation. The breeze also could be impregnated as well as the coke. The value of ammonia being about £60 per ton, the percentage of ammonia taken up by a ton of pulverized coke could be ascertained, and its value per ton for agricultural purposes determined. [Signed, John Malam.]

Sensitiveness of Plants to Poisoning by Illuminating Gas.

The "Pharmaceutical Journal" reproduces from the Chemical Abstracts in the "Botanical Gazette," 1917, No. 11, p. 1447, a summary of an article on this subject by S. L. Doubt. He points out that increasing loss of plants in greenhouses and trees in streets in American towns is attributed largely to coal gas poisoning. From their sensitiveness in this respect, tomato plants, *Salvia splendens*, *Mimosa pudica*, *Ricinus communis*, *Datura stramonium*, and *Dianthus caryophyllatus* are recommended as test plants. In all these, except the carnation, 50 parts of coal gas per million of air cause epinastic growth of petioles; and the flower buds of carnations wither in this degree of atmospheric gas pollution. A dilution of gas 1:1000 causes the leaves of all these to fall off, as well as from *Coleus* and *Hibiscus rosa sinensis*. Ethylene alone gives similar results. The following plants are found not to be affected by a concentration not exceeding 1:400 of illuminating gas in air, which is the smallest amount that can be detected by smell: *Calladium esculentum*, *Lupinus perennis*, *Eriobotrya japonica*, *Phœnix canariensis*; *Conocephalus sp.*, *Canna*, *Achyranthes indini*, *Altermanthera sp.*, *Cytisus canariensis*, and species of *Polypodium*. Many trees, including elder, ash, elm, lime, and catalpa—are very sensitive to gas escaping into the soil. Simple tests are detailed by means of the above-named gas-sensitive plants to detect small amounts of atmospheric contamination.

German Illuminating Engineering Society.—The announcement of the fourth annual general meeting of this Society, which was to be held on Saturday, the 15th inst., at the Imperial Physical-Technical Institute at Charlottenburg, gives the following agenda: Report of the Council and other private business; report by Dr. H. Lux, of Berlin, on the "Inception, Organization, and Programme of Committee No. IV., which deals with the Practical Lighting Questions;" paper by Dr. Bloch, of Berlin, on "Uniform Evaluation or Marking of Sources of Light;" and a paper by Dr. Halbertsma, of Frankfort-on-the-Maine, on "Diffusion of Light as a Means of Diminishing the Surface Brightness of Artificial Sources of Light." The President of the Society for the current year is Dr. E. Warburg.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Briton Ferry.

IN spite of war worries and inclement weather, there was a very good attendance last Wednesday at the Autumn Meeting of the Institution, which was held at Briton Ferry, the home of the new President (Mr. J. Mogford), who delivered his Inaugural Address, and on the conclusion of the business entertained the members at luncheon. The proceedings included a paper by Mr. W. H. Cattell, the Chief Salesman of the Swansea Gas Light Company, on "Promoting Gas Sales;" and the discussion on this had not concluded when the time for adjournment had been reached. In the afternoon, there was much of interest to be seen; and altogether a profitable day was spent.

The Business Meeting was held in the Briton Ferry Council Chamber; and at the outset of the proceedings, Mr. J. E. KENSHOLE, of Merthyr Tydfil (the retiring President), occupied the chair.

A WELCOME.

Mr. GEORGE DAVIES (the Chairman of the Urban District Council) said that his duty was a brief and pleasant one. It was just to welcome the Institution to their town, which was a very small one. They laid no claim to any great fame or notoriety as a public body; but they felt the Institution had added some dignity to them by electing their Gas Manager, Mr. Mogford, as their President. This they looked upon as reflecting credit not only on Mr. Mogford, but also upon the Council whom he had served for the past twenty years. The Council appreciated the honour equally with Mr. Mogford, having always looked upon the Institution as serving a very useful purpose. They had tried to carry out what they considered to be the chief duties of a local body mainly concerned with the health of the people; and they had, he believed, always been advised wisely and well by their officials, and chief among them Mr. Mogford. His (the speaker's) own experience, gained in the time during which he had taken part in public life, was that all councils would be well guided if they acted more consistently with the advice that was tendered to them by their officials. Speaking of a body like the Briton Ferry Council, which was chiefly composed of what might be called the democratic element—that was to say, there were no men of great means who took any keen interest in local affairs, and the members were elected largely, if not solely, from the working classes—the general impression was that their main duty was to see that they had a sprag under the wheel of the public official. There was an idea at the back of the heads of the people that the chief function of a public authority was to discourage expenditure advised by their officers for the improvements which were necessary for carrying on work successfully in a town like Briton Ferry. But the Council, though bound by the restrictions put upon them, and by the limitations imposed by the low rateable value of the district, did their best to keep abreast of requirements, by acting upon the advice tendered from time to time by their officials. These officials were quite twenty years ahead of the members of the Council in all that was done; but the Council tried to keep up, as far as lay in their power, regardless of criticism from the outside with respect to expenditure. It was only fair to say, too, that if the public in general in the neighbourhood had been as far-seeing as Mr. Mogford, if employers and those who owned industries had looked as far ahead as their Gas Manager had, they would have been better off now. For the past ten years Mr. Mogford had been making suggestions which might have been detrimental to him personally, and yet would have been economical from the engineer's point of view, and would have served the interests of the public a great deal better than things as they now existed with respect to power and light. He welcomed the members, and hoped their deliberations would be interesting and instructive, and would result in good to the general public.

Mr. J. H. CANNING (Newport) thanked the Chairman of the Council, on behalf of the Institution, for his cordial welcome. He said that, under the able direction of the Council and their officials, he had not the slightest doubt that the town would see great developments in the future. They would all endorse the very high terms of appreciation in which the Chairman had spoken of their new President, Mr. Mogford. The honour that the Institution had conferred upon him was well deserved. They had all known him for years, and realized his ability; and he was sure that he would do credit to the Institution during his term of office, and have a most successful year.

CONFIRMATION OF THE MINUTES.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the previous meeting, and they were confirmed.

NEW STUDENT.

Mr. Fernand Dupont, Articled Pupil at the Neath Gas-Works, was elected a student of the Institution.

THE RETIRING AND NEW PRESIDENTS.

Mr. KENSOLE said that, before asking the new President (Mr. Mogford) to take the chair, he would like to thank the members for the courtesy they had invariably shown him during the past year, and for the good attendances there had been at the meetings. It had been a source of great pleasure to him, as it must be to any President, to see the meetings well attended. He would also like to thank their friend Mr. Octavius Thomas for the work he had done as Hon. Secretary during the year. He would now call upon Mr. Mogford to take up his office.

Mr. J. MOGFORD (Briton Ferry) then took the chair, amid applause, and thanked the members for their cordial reception. He then proposed a hearty vote of thanks to Mr. Kensole for the able manner in which he had carried out the duties during the eighteen months he had occupied the chair. Mr. Kenshole had, he said, from the commencement taken the very keenest interest in the business of the Institution; and although they had been passing through extremely troublous times, he had conducted the proceedings in a manner which reflected the highest credit on himself and would be of lasting benefit to the industry of the district. Both individually and collectively they were indebted to him for the information he had given in his address with regard to rating and taxation, and for the unremitting attention he had given to the Institution's affairs.

Mr. H. D. MADDEN (Cardiff), in seconding, said Mr. Kenshole had been a genial and unruffled President during a time when occupying the chair had been very much harder than before. Every year brought increasing duties and greater anxieties to the President of a District Association; and Mr. Kenshole had worked extremely hard, not only for their own Institution, but for the industry at large.

Mr. KENSHOLE, in acknowledging the vote, said that what he had done had been a labour of love, and he hoped it had been of some advantage to the Institution. It certainly had been of considerable benefit to himself. Eighteen months ago, when he took up the position because of the absence of their then President, Mr. A. W. Branson, he hoped very sincerely that during his term of office this terrible war would have terminated. This hope had not been fulfilled; but he trusted it would be before Mr. Mogford vacated the chair.

Mr. MOGFORD then delivered the following

PRESIDENTIAL ADDRESS.

Gentlemen,—I thank you for the honour you have conferred upon me in electing me your President, and trust that, with your assistance, I shall maintain the interest and the usefulness of the Institution during my year of office. The Institution has maintained a steady growth. It has more than fulfilled the hopes of its founders; and the benefits of intercourse and co-operation which it affords its members have been advantageous in the past, and should prove of inestimable value in the immediate future.

The war, which seems destined to embroil all nations upon earth, has brought to the gas industry serious difficulties and responsibilities; and those who serve the industry may justly feel proud that the difficulties have been overcome in a manner which merits the compliment paid to them by Lord Moulton through the Institution of Gas Engineers.

For more than a century gas manufacturers have trodden an uneventful way—pursuing their art in accordance with the plans of Murdoch, Clegg, Croll, and Barlow; carrying out their statutory obligations, within their statutory areas; and paying their statutory dividends. Original research and the treading of new ways have been left to the "other fellow," with the result, as we now find, that we have gone so far as to provide our greatest enemy with the chief requirements for waging war upon us.

The fall of the year 1914 brought its rude awakening; and England is to be felicitated that she still possessed, in the gas industry, the men and the means that could produce the explosives that enabled her armies to drive the enemy from the Marne to the Aisne, and can, if need be, provide sufficient for them to blast their way from the Aisne to the Rhine.

THE NEED FOR RELIEF.

Gas engineers have not been accustomed to "shouting from the house tops;" but the time has come when what Lord Moulton designates as "not only one of the most important industrial bodies in the country, but one which has to face a great practical work on which almost the existence of our present civilization rests," should, in the interests of the undertakings they control, do as his Lordship thinks they are entitled to do: "Point out to the world how much, and in what way, the country is indebted to the industry for its safety in this war."

An industry whose operations are essential for the defence of the realm, and whose products are equally as important in times of peace, must of necessity be a valuable national asset; and as such its operations and interests, financial and technical, should be jealously guarded, and its factories maintained in a condition that would enable them to meet all demands upon them. From perusal of the technical journals it is patent that such efficiency is not now being maintained, and that the proprietors of many undertakings have to contend with serious financial difficulties. It should be the business of the National Gas Council, as custodians of the interests of the industry, to obtain some measure of relief for such cases. By so doing they would possibly avert contingencies that might cripple the undertakings for a decade. The position is one which will not be improved by delay.

Parliament has fixed the prices of gas and sulphate of ammonia. Tar, the product essential to the saving of the nation and civilization, has dropped about 10s. per ton from the pre-war price. Dividends are reduced; and the market value of shares has in many cases almost reached bankruptcy levels. All extensions are stopped for want of capital. Repairs are postponed owing to high prices; and reserves are being depleted for maintenance

purposes. Wages have increased. Coal, in South Wales, has gone up by 50 p.ct.; and its quality can hardly be said to have improved.

Where the prices fixed by Parliament are such as to preclude the payment of a fair dividend in present circumstances, it is not unreasonable to ask that prices should be revised. If a concern has to increase its prices, in such a manner as would tend to reduce its efficiency from a national standpoint, financial relief should be granted in some form. In many instances, suppliers of our raw materials are paying excess profit tax. Might it not be feasible that such material could be supplied to gas-works at a lower price? The prices paid to works for products of national importance should also be reviewed. The time has come when the leaders of the industry should urge upon Government Departments the desirability of gas-works being kept in a condition that will enable them to supply the demands of war time, and the necessity for preparing such an indispensable industry for the leading place that it must take in the commercial reconstruction of the nation.

CASE OF THE EMPLOYEES.

Your Commercial Section has had under consideration the wages paid by gas undertakings. Lists of wages have been collected and tabulated; but circumstances prevent the matter being carried further for the present. Wages in different districts will differ in accordance with local circumstances; but uniformity in particular areas would tend to minimize unrest among employees. In every case, the remuneration should be such as would compare favourably with that paid for similar work by other industries in the respective districts, so as to attract the best kind of workmen to gas-works.

There are in England and Wales some 800 gas-works with an annual output of 50 millions or under; and 600 of these supply less than 20 millions of gas a year. The control of these works (which form a numerical majority) is a matter of considerable importance to the gas industry. The proprietors of the works cannot expect a rush of graduates in engineering for the chief appointments on their undertakings; neither would the positions prove attractive to the specialists of the larger works. The appointments must, therefore, continue to be filled by the more ambitious in the ranks of small and medium-sized works; and the manning of such ranks with the best available units would result in the betterment of small concerns and of the industry.

TECHNICAL EDUCATION.

The parent Institution has for some years given considerable attention to the importance of technical education and original research. There is just now afoot in South Wales a strong movement for the advancement of technical education and original research in connection with the different industries. The Commercial Section of this Institution has promised to support the scheme; and, in the interests of the industry, each member should ask the proprietors of the undertaking with which he is connected to give the matter sympathetic consideration.

I understand that the immediate proposal is to augment the facilities now available for the work in question at Cardiff and Swansea. Swansea has, for many years, maintained a Technical School, which has been well patronized by the employees of the local industries. The engineering and the metallurgical courses include subjects allied to gas manufacture; and there can be no reason why the coming reorganization should not include facilities for intending gas engineers, or at least prepare students for the scholarships of the gas industry at Leeds.

EARLY WORK IN SOUTH WALES.

The scheme is one which for another reason should commend itself to this Institution. The text-books of our art tell us of the struggles and ingenuity of Murdoch, Clegg, Croll, and others; but apart from the tribute paid to Dr. Watson, Bishop of Llandaff, there is no mention of the work done in South Wales during the infancy of the industry. While yielding to no one in my homage to Murdoch and his compeers, I claim that it is my pleasure to have invited you to-day to a district that must have been at least one of the cradles of the gas industry. I must confess to a certain amount of pride in the exhibit to which I invite your attention at the close of the meeting. It consists of plans, detail drawings, and rough sketches of some of the first gas plant ever erected, and is documentary evidence that as much work was done by local engineers in the twenties of last century as was executed by Messrs. Boulton and Watt.

It therefore behoves you as the present-day representatives of these Welsh pioneers to use your influence in the advancement of technical education, and thus maintain the district in the leading place it occupied in the early days of gas manufacture.

Incidentally, I would draw your attention to the fact that intermittent vertical retorts and a few other modern devices were not unknown one hundred years ago.

CO-OPERATIVE TAR DISTILLATION AND SULPHATE MANUFACTURE.

Your Commercial Section has had under consideration a proposal for the working of co-operative tar distilleries; and the matter has been referred to the National Gas Council. The prices which small works receive for their tar indicate that some arrangement of the kind is necessary. A similar arrangement for dealing with ammoniacal liquor would be advantageous, if applied to groups of small works. It would help to relieve the railways, and convert the considerable quantities of ammonia which now go to waste into a much-needed fertilizer. A simple means for the direct manufacture of sulphate of ammonia would, if it could be adopted without purifying troubles, prove a boon to small gas-works. I have often wondered why the direct method patented by Croll, and used by him at several gas-works, was discarded.

GAS *v.* ELECTRICITY.

The question of the competition between gas and electricity is one which you have discussed on many occasions. It is well in the interests of both supplies that a spirit of rivalry should be maintained; but there are limits within which such rivalry should be confined. Personally, I confess to being a firm adherent to the opinions expressed by the late Mr. J. G. Newbigging in his address to the Manchester Institution in the year 1914. The two commodities are applicable to precisely the same uses; both are indispensable to the comfort and well-being of the community; and, for national economy and the welfare of the general public, the users of both commodities should be able to obtain sound impartial advice as to which is best-suited to their particular requirements. We are urged, for national reasons, to economize in every direction; and one cannot but agree with Mr. Newbigging that "the avoidance of rash and unfair competition would result in the saving of large sums of money, make for better efficiency, and give greater satisfaction to the public whom we serve."

The proposed linking-up of electrical undertakings, and its probable effect upon the gas industry, are matters which should command the attention of every gas engineer. The technical journals of the industry have, on more than one occasion, dealt with the subject in language which lacks nothing in emphasis. The present proposals of the electrical industry may not have a serious effect on the largest gas-works; but medium-sized concerns will find that the resultant economies in electrical supply will accentuate the already keen competition, and smaller undertakings, wherever the high-tension connecting lines touch or pass through their districts, may be faced with competition which might prove disastrous.

Provision of a cheap supply of light and fuel will be of such importance in the coming commercial renaissance that Government Departments will be compelled to bring into prominence the question of gas and electricity supply; and the welfare of the gas industry demands that immediate attention be given to the admonitions of its technical press. In any case, the interests of the industry should be protected by the formation of District Committees for discussing the subject on the lines adopted by the electrical industry.

Nine years ago I ventured to place before you a suggestion for the inter-connection of gas-works in this district. Many parts of the area have since been lit electrically, and are lost to the gas industry. These installations will presently be incorporated in the larger scheme and linked-up to control generating stations. In order to obtain a clear conception of the benefits to be derived from a linking-up scheme in this locality, a short description of the district and its industries will be of assistance.

Geographically, West Glamorgan may roughly be described as a series of valleys converging on Swansea Bay. The district has for centuries been known as a metallurgical centre; the chief industries being the production of copper, silver, spelter, and iron, together with the manufacture of steel, tinplate, with all the subsidiary engineering shops and factories. Coal underlies the whole area—the northern part producing anthracite, and the southern a more or less bituminous variety of coal.

The proposal of the electrical industry, as I understand it, is to link-up the existing generating stations at Llanelly, Swansea, and Neath, and to subsequently connect-up the valleys. Note is being taken of the large steam-engines which are used in the district as prime movers for mills, &c., and also of the comparatively large electrical generating stations at collieries and works throughout the area. A feature which is of more interest to the gas engineer is that the smelting works consume large quantities of metallurgical coke, considerable amounts of which are produced in beehive and other non-recovery ovens. These ovens are now being replaced by modern ovens fitted with recovery plant. Huge quantities of bituminous coal are gasified for heating steel and other furnaces, and many thousands of tons per annum are used for heating and annealing purposes in tin plate factories. The total quantity of coal used, the bye-products from which are lost, must be immense. This combination of circumstances is interesting from the lighting, heating, and power point of view. It should commend itself to the British Association Fuel Economy Committee, and also to the Fuel Research Board, in connection with their investigation as to the most suitable gas for general use.

The Lancashire and Cheshire report on the linking-up of electrical undertakings says: "The time has passed when power to generate electricity, which is so vital to the interests of the trade of the nation and to the efficient employment of the nation's principal source of wealth—coal—should still continue to be exercised solely for the purpose of supply within a limited area; and, in order to deal efficiently with the future requirements, they consider it essential that extensions of existing stations or the provision of new plant should only be proceeded with after due consideration has been given, not only to the requirements of the particular area in which such stations may be situated, but also to the actual or potential requirements of the surrounding districts. In other words, the provision of efficient generating plant has ceased to be a matter which only concerns each separate undertaking as it is at present constituted, but has become an

important element in the welfare of whole districts, without regard to municipal or other boundaries."

This paragraph is equally applicable to gas supply; but I would go further, and say that the time has fully come when the supply of light, heat, and power to an industrial district should, in the interest of the trade of the nation, be obtained by the destructive distillation of coal, the recovery of its valuable bye-products, the complete gasification of such of the residue as is not required for metallurgical purposes, the distribution of gas of such composition as investigation shall prove to be most suitable for general purposes, and the distribution of electricity generated by means of internal combustion engines.

A Vote of Thanks.

Mr. KENSHOLE, on the conclusion of the address, proposed a hearty vote of thanks to the President. He said he had been very gratified at the contents of the address, because they indicated a prosperous year with Mr. Mogford in the chair. While they had members to take the chair and prepare addresses of this description, they might be sure the Institution would continue to flourish.

Mr. J. H. CANNING (Newport), in seconding the vote, remarked that the President had covered a wide field, and had pointed out to a great extent the path that must be followed in the development of the industry, if they were to maintain their ground. There was one matter he would like to emphasize, and that was the hope which had been expressed that the Government might see their way to assist gas undertakings in a more substantial manner to bear the burdens they had undertaken in the national interests. He knew there were a great many claims at present on the Government for assistance in one way or another. But the gas industry had performed services to the country the magnitude of which could not be exaggerated; and, largely as a consequence of the altered condition of affairs which the Government had been obliged to bring about for the national good, the industry had been subjected to considerable hardships and difficulties. He did hope the various bodies representing the gas industry—including their local Institution—would do what they could to press the Government, in order that they might obtain a little better support in the future than they had had in the past.

The vote was then cordially passed, and duly acknowledged by the PRESIDENT.

Report of the Special Purposes Section.

There was then submitted the seventh annual report of the Special Purposes Section. This stated that one local authority and four gas companies had joined the section during the past year, making a total membership of 29. These members carbonized 85 p.ct. of the coal in the South Wales area. Six meetings had been held during the year, at which various matters had been discussed. It was pointed out that it was advisable to push the local consumption of coke as much as possible, because, owing to the shortage of railway wagons and steamers, it would be difficult to dispose of the increased make during the coming winter. A conference of Commercial Sections was held in Birmingham last October, with the object of arranging depôts on main roads in the United Kingdom for the supply of coke to vehicles at present equipped to use coal or alternately coke fuel only. Vehicles using coke were largely on the increase, and depôts had been arranged with marked success in the neighbourhood of London. After circularizing the whole of the gas-works in the Wales area, a list was sent to the Commercial Motor Users' Association indicating places where coke could be obtained. This would be published in the next issue of their guide-book. Considerable attention was given to the low price received for tar. At the request of the National Gas Council, two members were appointed to represent the section on the Committee selected to consider the financial hardships that gas undertakings have suffered through the war, and to decide the best method of relieving such cases. The Committee were satisfied with the work done during the year; and much more could have been done if more funds had been available.

Mr. T. H. HAZELL (Newport) thought that a study of the seventh annual report of the Special Purposes Section would reveal the extent of the work that had been done. It was a satisfaction to find that some of the undertakings previously outside the section had now become alive to the value of connection with it. One could only hope that the time was not far distant when it would be looked upon as one of the first duties of a gas undertaking to associate itself with the work performed by the section. Reference was made in the report to the supply of coke to vehicles. Those who were present at the Merthyr meeting of the Institution would remember that a useful paper was then read by Mr. W. C. Jackson, of Neath, urging the use of coke for motor lorries. It seemed as if those who were using lorries were taking the matter into their own hands, and that gas was going to be used more than was at one time expected as a driving power for heavy vehicles. He did not know whether much encouragement had been given to this movement by the gas industry; but practical men who used the vehicles had discovered the value of it, and were looking to gas undertakings as a means of helping them out of the difficulties in which they found themselves at the present time. The only other point in the report which he need touch upon was that relating to financial hardships. There was no doubt that, owing to the demands made upon the industry by the Government, in connection with work necessary for the carrying on of the war, considerable difficulties had been imposed upon gas undertakings. Now, no industry could make bricks without straw; and when it came to imposing upon an industry the outlay of large sums for the purpose of erecting special and additional plant, and then later on practically scrapping the whole of the plant—those who were in the industry would know exactly what he meant—it was time that some consideration was given by the Government to the position of affairs. The war had caused their industry to suffer very severely. In some cases they heard of companies and authorities getting through with a small addition to their price and a satisfactory balance-sheet; but there was scarcely to be found a gas undertaking in the country that had not suffered in one way or another, and it certainly was a time when they ought to be able to look with confidence to the new Council that had been created in the interests of the industry to take action, and take it quickly. There was some remote idea of dealing with it after the war was over. But public authorities had short memories; and if the matter was to be dealt with at all, he thought they would agree that it should be done when "the shoe pinched." ["Hear, hear."] They were told in the report that the accounts were satisfactory, and that the Treasurer possessed the magnificent balance of 7s. 9d.; but he would strongly direct the attention of those undertakings that were not at the present time associated with the Commercial Section to the statement that the work had been done satisfactorily, and much more could have been done if funds had been available. Certainly the section could do more good if it had the support of every undertaking in the district. He moved the adoption of the report.

Mr. E. H. SWAIN (Pontypridd), in seconding, agreed that the membership of the section could do with a little recruiting. Speaking for himself, he never attended a meeting of the section without profiting in some way. He was specially glad to see the interest taken in the matter of financial hardships. They had been very badly hit; and, in season and out of season, it would seem that the section and the Institution must press on the National Gas Council to bring to the attention of the Government the many hardships under which gas undertakings laboured, and for which they wanted relief.

The report was then adopted.

Representative on the Council of the Institution of Gas Engineers.

On the proposition of the PRESIDENT, seconded by Mr. R. A. BROWNING (Neath), it was agreed that Mr. J. E. Kenshole should be the representative of the Institution on the Council of the Institution of Gas Engineers for the year commencing in June, 1918.

Promoting Gas Sales.

Mr. W. H. CATTELL, Chief Salesman of the Swansea Gas Light Company, then read a paper entitled "Promoting Gas Sales," which, with a report of the discussion, will be found on pp. 560-63.

The District Council Thanked.

Proposed by Mr. CLARRY, the Chairman and members of the Briton Ferry Urban District Council were thanked for allowing the use of the Council Chamber for the meeting.

Place of Next Meeting.

It was decided that the place of next meeting should be left to the Council to decide.

Subsequent Proceedings.

The meeting over, the members and friends proceeded to the Royal Dock Hotel, where they were guests of Mr. Mogford at luncheon. After the Loyal Toast, Alderman Canning proposed "The Chairman and Members of the Urban District Council of Briton Ferry;" remarking that they had in their hands not only the gas-works, but also the electric light and water supply, among other things; and all these undertakings were well carried on. More than this, they had shown themselves capable of dealing with a problem which many other Councils were afraid almost to attack. He referred to the housing problem. With the toast, he coupled the name of Councillor Joseph Branch, who (in the enforced absence of the Chairman) replied, and declared that he felt proud of all the kind things that had been said of the Council. They were proud to have the Institution visit their town; and they were prouder still to feel that the visit was in connection with the election of one of their officers as President. They all thought very highly of their officials, who were not behind those of any other town in the United Kingdom. As to the gas undertaking, during Mr. Mogford's management the consumption had increased to five times what it was when he came. Besides, he had carried out many improvements which had given great satisfaction to every member of the Council. Councillor Watts proposed "The Wales and Monmouthshire District Institution of Gas Engineers and Managers," remarking that if the Institution got out of Mr. Mogford as President what the Council had had as Gas Engineer, they would have no cause to regret their choice. Works which were in a derelict condition twenty years ago had, through his foresight and perseverance, become model works for their size. He wished the Institution every success in their great work. Mr. Mogford, in response, said, prior to the formation of the Institution, managers in the district had no means of intercourse. Each was buried away in his own works, with no one interested in him, and the man in the street caring nothing as long as the gas supply was maintained. This had since been changed; and he would like to say a word in appreciation of the manner in which the engineers of the larger works in South Wales had interested themselves in the Institution, and the brotherly—or he might say fatherly—manner in which they had met those in control of the smaller works. The gas industry was never more necessary to the welfare of the nation than to-day. It had on several occasions been "condemned to death." In the early time of electrical engineering, it was thought that the days of the gas industry were numbered; but it was then given a new lease of life. To-day it was being re-vitalized by the Germans in another manner. It was found that, by sending them the products of tar, they were providing them with the means of making dyes. The manufacture of dyes was akin to the manufacture of explosives; and for some time before war was declared the Germans were undoubtedly using what was sent for the purpose of manufacturing war material for use against this country. England would see that in future she was independent of foreign made dyes and explosives, and that the gas industry was maintained, as it must needs be in the national interest, as one of the most important industries in the land.

The afternoon was enjoyably spent between the gas-works and

several factories where interesting processes are in operation. These were the Briton Ferry Iron-Works, where were seen blast-furnaces making the pig iron from the ore; the works of the Briton Ferry Steel Company, where shell steel was being made; and Messrs. Taylor and Sons, where they were turning out the shells. By the last-named firm, tea was kindly provided. After the whole process of shell manufacture (as far as it is carried at the works) had been explained by the proprietors, speeches were made by Mr. H. A. Clarke (Surveyor to the Council), Mr. Jones (Captain of the Fire Brigade), Mr. W. Cleaver (Engineer to the Port Talbot Docks and Railways), and others.

The Gas-Works.

As to the gas-works themselves, there is not a great deal to be said. When Mr. Mogford went to Briton Ferry twenty years ago, he found himself faced with the familiar uphill fight of a small works over-capitalized, which had been allowed to get into a bad state, and was losing about £800 a year.

At that time—in 1897—the number of consumers was 250, and the make of gas 8 million c.ft. per annum. This was a state of affairs which he immediately set about to alter. For one thing, he introduced free installations, and arranged exhibitions and demonstrations. By this and other means, the number of consumers was rapidly increased, until at the present time there are about 450 ordinary and 1200 prepayment; the gas output last year being between 38 and 39 million c.ft. This year it will certainly be from 3 to 4 million c.ft. more; for in the past two months there has been an increase of over a million c.ft.—due, of course, to the munition work being carried on in the district.

The price of gas twenty years ago was 3s. 9d. per 1000 c.ft.; and now it is being sold at 3s. 2d. to 3s. 6d., with 8d. extra for prepayment meters. These were the pre-war charges; and they have not been increased. It has been necessary to use up the reserve for extensions since the war; but Mr. Mogford is hopeful of being able to avoid raising the price of gas, because some of the loans have been paid off, which will relieve the undertaking of a charge of about £600 a year. The works have been from time to time added to, in order to meet the growing demand; for now practically every house has a supply of gas.

A railway siding into the works has been arranged for; but at present it is as cheap to cart the coal, which is brought in and dumped in the retort-house at a cost of 6d. per ton. There are four beds of six retorts, with shallow generators; and the make has in the twenty years gone up from 9000 to 11,500 c.ft. per ton of through local coal. The exhausters are not direct-coupled, but driven by a gas-engine off shafting, which is also used to drive the rotary scrubber and all the pumps. This has been the method adopted for many years; and with this drive, and the retort-house governor, no difficulty is ever experienced. As a stand-by, an electric motor is provided; and in the same house there is another gas-engine which is used for running a mortar mill. All the pan breeze produced is utilized for mortar for the Council and anybody else who requires it. Of the two holders, one (by Messrs. W. C. Holmes & Co.) is spiral-guided, and contains 280,000 c.ft.; while the capacity of the other is 75,000 c.ft.

High-pressure gas is not supplied by the undertaking; but some of the customers have their own compressors. In connection with distribution, one other point is worth noting. The Council have a main running out to supply the navigation lights for the harbour at the mouth of the river; and at high water the farthest light is over two miles at sea. The main, which is a 2 in. and 3 in. cast-iron one, is laid in blue clay; and during the thirty years it has been in position, it has given scarcely any trouble. The only two occasions Mr. Mogford can recall are one when the bank in which the pipe is buried slipped into the bed of the river, and another when the propeller of a steamer passing over the top nipped the standpipe of the syphon. He naturally regards this as a good instance of the longivity of mains in difficult positions.

South Wales and Early Gas Plant.

It will have been noted that, in the course of his address, the President referred to the important part played by South Wales in the provision of manufacturing plant in the very early days of the gas industry. Attached to the walls of the Council Chamber during the meeting were a number of plans, signed and dated, which amply bore out his claim; and it is to be hoped that the members found time to carefully examine them. But it should be said that these constituted only a small proportion of the documentary evidence in Mr. Mogford's possession. There are in his office innumerable plans, specifications, &c., of gas-plant work carried out in the early (and later) years of last century at the works of the Neath Abbey Iron Company, which also had much to do with early steam-engines, and things of that kind; and many of them are of peculiar interest, apart from their use as evidence on the particular point which Mr. Mogford was making in his address.

To mention only a very few, there are plans for complete gas-works at Carmarthen, dated 1822; Havod Rolling Mill, 1820; their own Abbey Works, 1820; and Youghal, 1830. There is a vertical retort designed for Pontardawe in 1839; while in the case of the Havod Rolling Mill the retorts are in the open, and the only other plant shown is a wet lime purifier and a holder. The retorts for Carmarthen were kidney shaped; and for Neath there was designed an oval gasholder (dated 1842), which, however, seems never to have been built. The vertical retort drawing, which is signed "E. O. and M. Manby," shows what may have been intended as an arrangement for steaming. Many of the plans, &c., bear the name of "E. O. Tregellis." The first plans for Carmarthen show a gasholder house; but there is no evidence as to whether it was ever built. In an old book there is, too, a sketch of a retort for distilling tar. A few of the other plans noticed related to work at Aberdare, Ashburton, Barnstaple, Bridport, Colchester, Dover, Exeter, Falmouth, Galway, Haverfordwest, Llanelly, Ross, Saffron Walden, Swansea, Tralee, Usk, Wellington, Witham, Yeovil.

Mr. Mogford's interest in the Neath Abbey Works arises to some extent from the fact that his grandfather was engaged there. The descendants of many of the other people who worked there are still in the district. Sir Benjamin Baker was apprenticed at these works.

PROMOTING GAS SALES.

By W. H. Cattell, of Swansea.

[A Paper read before the Wales and Monmouthshire Association, Sept. 19.]

The systematic development of gas sales is a subject which should be of more than passing interest to every gas manager. Much has already been said and written on the subject of showrooms; but I feel certain it is only the most receptive minds and the better equipped companies which have benefited. Many gas-works are still without the selling agency and advertising effect of a showroom. To managers to whom this applies, I would urge a reconsideration of the matter at the earliest possible moment.

It is a truism that anything which is necessary for the proper and good conduct of a business is paid for, directly or indirectly, whether purchased or not. Applied to the subject under consideration, this means that if the provision of a suitable showroom would help the sales of gas in your district, by continuing without one you are losing.

Selection of a Show-Room.

I presume we are all agreed that the provision of a showroom is a modern necessity in connection with every gas-works. Probably those engineers who have not yet equipped their undertakings in this direction are the victims of circumstances over which they have no control. Admitting the desirability of a showroom, I will call attention to a few points to be observed in the selection of suitable premises and equipment.

1. The gas-works are rarely (if ever) situated in the main shopping thoroughfare of a town; and it meets the convenience of gas consumers to have conveniently arranged central offices for transacting all ordinary consumers' business.
2. The provision of a central office, at which consumers may be requested to pay their accounts, enables the management to display in the same room or rooms gas apparatus which will appeal to all users or prospective users of gas.

I take it that the real function of a showroom (apart from the receiving of accounts) is: First, to show gas-consuming appliances of suitable design in suitable surroundings, and wherever possible under working conditions, with the object of creating in callers a "desire to possess," as undoubtedly the creation of this desire is the essential feature whether one is attempting to sell by advertisement or by ocular demonstration; secondly, having interested your prospective customer, to sell to him such apparatus as may be most suitable for his particular requirements, remembering that the whole transaction—including the sale of the apparatus, the fixing, the working of the apparatus when fixed, and the subsequent gas consumption—must all be to the consumer's satisfaction. Mere turnover and profits on appliances sold are not the goal to which selling staffs should strive.

Requirements of a Show-Room.

Commencing a brief review of a showroom from outside the premises, one should remember that the paintwork and general appearance should be that of a smartly conducted business, and that the windows are a most important item. Windows provide the cheapest and most attractive method of calling the attention, not only of callers but of all passers by, to the advantages of using gas for some purpose or other. The dressing of the windows should not be done in a careless and perfunctory manner. Do not make the place look like a third-rate ironmonger's shop or an extra storeroom for odds and ends. Effective and distinctive displays should be aimed at.

A striking illustration of an interesting and attractive window display is the bye-product scheme conceived and carried out by my chief, Mr. Reginald Clarry, which was described in the British Commercial Gas Association's "Bulletin" for December, 1916. The chief feature of the scheme was a number of sample bottles of the bye-products of the gasification of coal. These bottles were grouped in the showroom window with a framed card in front of each, as, for example: "*Benzol.*—A motor spirit of greater power and efficiency than petrol. Used in the manufacture of high explosives and aniline dyes." At the back of the rows of bottles, boxes of various sizes of coke and breeze were shown. The good offices of the local Press were also called into service; and a number of articles on coal conservation appeared, in which public

attention was directed towards the display by the gas company. The comparison of the scientific and organized method of coal usage as against the crude and wasteful method, which was demonstrated with a heap of soot, greatly interested a number of local business men, who are normally not reached by the ordinary type of advertising. Local teachers were greatly interested, as were others, many of whom were from far-distant towns. Photographs of the display were supplied on application.

It is worthy of note that the bye-product display was inaugurated in June, 1916, in anticipation of the Government and general public interest now taken in the principles involved. Following on this display, the same central notice was maintained, and the old-fashioned and wasteful methods of heating were compared with modern gas heating and lighting equipment. This was followed by a similar comparison between an all-gas kitchen and a kitchen range heated directly by coal. More recently, we have fitted up one of the windows as a bathroom, with a geyser pouring hot water into a smart-looking bath. A white enamelled chair and a bath-mat, with a suitable scheme of decoration, give the finishing touches to the display.

In arranging any window show, exhibit plainly the price for which your consumer may have a duplicate fixed complete in his own premises.

On entering a showroom it is desirable that one should be impressed with the attractiveness of gas for all its demonstrated uses. Gas-fires should be shown fitted up against attractive mantelpieces, and with suitable furniture in close proximity. Cosy fireplaces, with nice curbs and hearthrugs and comfortable chairs, are a never-ending attraction. Have the price "fixed complete" shown against each, and be prepared to sell the mantelpieces and tile surrounds and hearths if required. Avoid ugly fitting work, by making gas connections very neatly. Where possible, show no pipes—bring the supply up under the fender of the gas-fire. At least one gas cooker should be fixed up in surroundings looking as homely as possible; and avoid placing fires, geysers, grillers, and sundries all round it. A bathroom fully equipped with a geyser, bath, hand-basin, and the usual bathroom conveniences, will be useful in attracting the attention of all who experience difficulty in obtaining hot water at will. The lighting goods should be all live points, ready for immediate lighting. Clean, up-to-date fittings should be shown—suitable globes, shades, and lamps being fixed in the various positions to demonstrate their particular uses.

One could say much of the weaknesses of many showrooms; but to do so would be to repeat the excellent notes of Mr. Cyril G. Davis, published in the "GAS JOURNAL" for Nov. 2, 1915. I would urge all gas managers to re-read this article, which has since been issued in pamphlet form.

Care should be taken in the selection and purchase of all apparatus for sale in the showroom. Only the best of everything is good enough. Avoid irritating complaints of overcharges afterwards, by quoting a price "fixed complete." It is quite a byword that a householder does not know how much it will cost him each time he calls a plumber into his house. This can be avoided by getting a signed order, stating the price to be paid before putting the work in hand.

FIXING FITTINGS, &c.

Having secured orders for apparatus, the fixing into position upon the consumer's premises should be carried out promptly by experienced fitters working under efficient supervision. Remember that the class of goods you sell, the way the fixing is carried out, and the impression given to a consumer, will result in your obtaining a reputation for good, for bad, or for indifferent work. A reputation for bad or indifferent work will take years of good work to live-down, whereas a reputation for good work is a standing advertisement and a certain indication of an increasing business.

Do not imagine that advertising is unnecessary. If you can possibly handle more business, the quickest way to obtain it is to advertise. Judicious advertising pays, and pays well—although sometimes one cannot see the results directly.

Never look upon each order as a completed transaction. Let your next order in any premises be the beginning of a series of such orders—not being content until the gas installation is quite complete, and the consumer satisfied with the careful and courteous attention he has received, and satisfied with the clean, convenient, and economical labour-saving appliances you have installed. The satisfied consumer is the best advertisement.

Managers who have well-appointed showrooms under their control will agree with me that such an establishment is a great asset in the conducting and in the prosperity of the undertaking, and by no means the white elephant it is supposed by a few to be. In addition to being a permanent advertisement for the proper use of gas and a convenience to all concerned, a well-managed showroom can be made to pay all its expenses, and possibly to yield a small profit.

TESTING COOKERS.

Apropos of my remarks *re* advertising, you have all seen the advertisements of the "Super-Multicooker," which is now being prominently pushed. In pursuance of the Swansea Gas Company's policy of obtaining information from practical trials and demonstrations for the guidance of their consumers, tests were made at my private house under my personal supervision, on behalf of the Company. I have much pleasure in submitting the following figures for your consideration, and only have to regret being unable to confirm the economies claimed for this cooker.

	July 28, Standard Make High-Class Cooker.	Aug. 25. Super-Multicooker.
Joint (leg of lamb)	3 lbs. 10 ozs.	3 lbs. 7 oz.
Vegetables—		
French beans, 2 pts. water .	¾ lb.	¾ lb.
Potatoes, 1½ pts. water . .	¾ lb.	¾ lb.
Time taken to cook	1 hour.	1 hr. 35 min.
Gas consumed	27½ c.ft.	40 c.ft,
Pressure of gas	27-10ths governed	*Increased to 45-10ths.

We are still carrying out tests on various types of cooking devices, with the desire to be personally and fully acquainted with the merits or otherwise of the different types, as compared with a standard make of high-class cooker. The advent of a much more efficient type of cooking stove has not yet come to my notice, although, in common with all who have the best interests of gas sales at heart, we in Swansea are eagerly looking for still more economical and efficient types of apparatus to place before our customers. All keen gas managers now recognize that the consumers' interests are also the interests of the gas companies, and that "Efficiency and Economy for the Gas Consumer" is the best policy to adopt.

DISCUSSION.

The PRESIDENT (Mr. J. Mogford, of Briton Ferry) said they were indebted to Mr. Cattell for the trouble he had taken in the preparation of his paper, which should give rise to a good discussion.

Mr. EVAN REES (Margam) remarked that the paper they had had the pleasure of listening to was an interesting one, and one of particular importance to every member, inasmuch as it contained hints of considerable value on the subject of the further utilization of coal gas. In the case of small works, with an output of from 50 to 60 million c.ft., a show-room was a decided advantage. In such a show-room as the author had pointed out, it was necessary to have the best types of appliances on view, so that both prospective and existing consumers might have demonstrated to them the undoubted benefits of gaseous fuel for domestic work generally. But, of course, the smaller undertakings could not go to the extent of the larger ones in the provision of the well-appointed establishments that were to be seen at Newport, Cardiff, and Swansea. The exterior was, however, often of less importance than the interior, so far as the smaller undertakings were concerned. As he had said, the appliances should be the best of their kind, and fixed in such a manner that the public could see just what they could have in their own homes. There still remained a very large field for the further development of gaseous heating. Personally, he believed that in the industrial towns of South Wales the public were ready to adopt this form of fuel. They were alive to the fact that the use of coal in an open grate was wasteful and dirty; and they consequently felt that they should develop in their own homes better methods—and certainly labour-saving devices. He thought the gas industry should do everything possible to help on matters by endeavouring to show the public, at all times and at all seasons, the advantages of the utilization of gaseous fuel in the best types of appliances. The interest of the gas consumer and the gas supplier was a mutual one. What was being done at present was only a tithe of what could be accomplished. It had been his pleasure at Port Talbot to fit up some villas which were entirely heated and lighted by gas, without a coal-fire at all. There were five of these houses; and they were anticipating further developments when the building boom came along. A domestic supply of hot water was provided as well; and the experience of the users was entirely satisfactory, because they could get hot water at any moment of the day or night, without any trouble whatever. The consumers were convinced of the economy of these installations as compared with coal; but it was necessary to point out that the question must be looked at all round. What the public should have was labour-saving facility; and the gas undertakings were in a position to provide this. Therefore it was up to the industry to do what could be done; and the hints and advice contained in the paper could be taken to heart with profit.

Mr. H. D. MADDEN (Cardiff) expressed the opinion that Mr. Cattell and his chief, Mr. R. G. Clarry, were to be congratulated upon the manner in which they had tackled the show-room problem in Swansea. What they had provided was quite up to date, and even in advance of the times. The paper was very opportune at the present juncture. It might be said that under war conditions there was a difficulty in obtaining materials for gas-fitting work; but, on the other hand, they had another consideration before them, and this was what the public wanted. The public, with this terrible war on, were faced with a problem which was having a great influence on the sales of gas, and this was the shortage of domestic servants. There was, he thought, no town or village in the country where it could be said that there was an ample supply of domestics. Certainly, it was not so in South Wales. Therefore, the public were going to look round for something that would relieve the household work; and gas was the only means of doing this—gas cookers, fires, irons, water-heaters, and appliances of this description. It seemed to him that the more the gas undertakings fixed of these, the better would be the service they were doing for the country. Of course, the most efficient fittings must be provided; but there was another word which the author seemed to have omitted. The appliances should be of a simple type. He felt that if gas was going to be used to the extent in the near future that every sign indicated it would be, simplicity and standardization would become very important considerations. A simple appliance that the consumer thoroughly understood would give much greater efficiency and much more satisfaction. There was one point he would like to mention, because he thought it was a subject that followed on what he had said as to the increased use of gas. This was the relationship between the show-room and the fitting department, in connection with the carcassing of houses.

* Previous trials not completed as cooking was too slow with lower pressures.

There were services that had been put in thirty or forty years ago, when the supply of gas was only used for flat-flame lighting; but matters had travelled far since then, and the addition of cookers and fires made all the difference. This was a point that needed to be kept in mind; and care should be taken that both pipes and meters were of ample size to supply the gas required with all the apparatus and lights going at the same time.

Mr. T. H. Hazell (Newport) said it had occurred to him, when hearing the paper read, that it was just the kind of contribution which might be expected from one who was more or less responsible for the arrangement of the Swansea show-room. It certainly was a credit to the whole of their district to see such a show-room as Swansea possessed. Of course, it was not the only one; but it was one of the very best type, and one that was bound to be a standing advertisement for the commodity with which they all had to deal. It was not suggested for a moment that the paper, which was a short one, covered the whole of the ground connected with the subject of promoting gas sales. If he might be allowed to suggest it as an addendum to the paper, there had been adopted by some undertakings a very efficient method of looking after the vast number of gas-cookers that were in use. For this work, a lady visitor had been appointed. He did not know whether they had one in Swansea; but he had found from experience that it was a very useful plan. She went to every house in which a gas-cooker was fixed, and asked if she might see the apparatus, if the user was satisfied, and if there was any help she could give. Of course, the visitor must be an expert herself; and wherever she found that the cooker was not working satisfactorily, or that the housekeeper possessed only a limited knowledge of the proper methods of working, she offered her assistance. Incidentally, the lady visitor found that even those who knew how to use a cooker valued her advice, and were only too glad to get the hints she was able to offer; and, besides, she was often the means of discovering places where gas-cookers supplied under the prepayment system without extra charge were never used for cooking purposes. There were some people who utilized them as cupboards, for keeping boots and things like that in. To persons of this kind, the visitor talked seriously, and with great effect upon the output of gas. He could assure the members as a positive fact that the visits of the lady adviser they had at Newport had led to a distinct increase in the output of gas from within the first few weeks of her starting on the work. One little matter in the paper had rather struck him, and that was the trouble taken to show the results of the test of the "Super-Multicooker. It proved the disinterestedness of the gas people and of the reader of the paper, that such pains should be taken to demonstrate the fact that with this appliance the consumption of gas was something like 50 p.ct. more in the same time than with an ordinary efficient cooker. From the point of view of satisfying the consumer, it was, of course, right to state the facts as given in the paper. It would have been rather interesting to have had a comparison with an electric cooker. The claims in respect of these were so very strongly urged by those who were interested in them that occasionally people got hold of one and tried it. As a rule, however, it was soon discarded. He knew of several instances in which, when a demonstration was given by the gentleman whose particular office it was to push the sale of electric cookers, members of the local authority attended the lectures with their wives and were so taken with the beauty and simplicity of the arrangement that they decided to have one as an experiment. After three or four spoilt Sunday dinners, they began to kick the cookers out of their houses; and in some cases he knew that gas had superseded them. With respect to the claims that were made for heating by electricity, certainly electric radiators were pushed to the disadvantage, or the supposed disadvantage, of gas-fires. There had been an idea in his mind for some time that a very effective working model could be exhibited in a gas show-room, when the claim was made that electric radiators were so much better than gas-fires, by sitting a couple of smartly-dressed children in the window, one before the most up-to-date type of electric radiator, and the other before a good gas-fire. Each would have a pile of bread, and a competition would be started to see which heap would be toasted the quicker. If this were done in public view, the thoroughfare would be so crowded that the police would come upon the scene, and very likely summon the gas company; but it would be a splendid advertisement for gas. [Laughter.]

Mr. Reginald G. Clarry (Swansea) congratulated Mr. Cattell on the compilation of a very useful paper, which did not by a long way refer entirely to Swansea. Much of what was said applied to all gas undertakings. It was purely the domestic side he was concerned with in promoting gas sales. Of course, there were other directions. Industrial heating was a wide subject; and in Swansea they had really not made very great strides yet. But they were hoping shortly to do so. The all-gas house was a thing they ought to aim at, because it really formed an excellent show-room in itself.

Mr. W. C. Jackson (Neath) remarked that they all benefited from the first-rate show-room at Swansea. He himself was much impressed with the point Mr. Madden had brought out, as to the standardization of the different appliances. Standardization had great advantages. For instance, take gas-burners. A man got accustomed to one sort, and small complaints were then much more easily remedied than if half-a-dozen different kinds of burners were being sent out. The part of the paper in which Mr. Cattell dealt with the bad results given by the "Super-Multicooker" had pleased him very much. He had been asked dozens of times why he did not get them for consumers, and was glad to have the information which the paper gave.

Alderman Thomas Canning (Newport) also joined in congratalating Mr. Clarry and the author on the possession of such an up-to-date show-room at Swansea. There was no doubt, he said, that in the promoting of gas sales the show-room took the first place; and this would become more and more emphasized as time went on. He knew that at times it might be difficult, and occasionally even impossible, to bring their committees to see the wisdom of having a good show-room and of expending money on exhibiting the articles that the public required. There was just one matter to which the author had not referred; the question of canvassing had been left out of the paper altogether. He (the speaker) was sorry it could not be omitted from consideration, for the simple reason that it was used so largely, and so very much to the detriment of the suppliers of gas, by those who were interested in electricity. The electrical undertakings by no means failed to make use of canvassing; they employed it largely, and with very big effect. He was pleased to see that in the show-room at Swansea there was given a place to the exhibition of charts and samples showing the products from coal gas; and he trusted that this would be taken note of and extended to every show-room. The war was inflicting very much hardship upon the gas business, running now into what might be serious financial hardship. But the Institution had three representatives—one on the Executive Committee of the National Gas Council, and two on a Sub-Committee to deal with these matters. No doubt, some relief would be obtained from the present financial difficulties; but they would have to raise money afterwards, and a show-room that exhibited the actual products would prove of great advantage to the investing public and to those who made the display. He had spoken of the disadvantages of the war; but one of its advantages had been that it had placed gas in a new light before the whole world. It had brought forward the admirable properties of gas, and had entwined it with every fibre of the national life. Gas was known now not only for its domestic uses, but as a great agent both for the navy and for the army. It was known as a big power in the commercial world, and for the vast advantage that it had been in the working of industrial concerns. The gas industry had also proved its great usefulness in connection with agriculture. He trusted, therefore, that in any advertisements that they might make of gas in the future, they need not confine themselves to the "parish pump" idea, but would carry the advertisements much further, and their just ambitions much higher than they had hitherto done. ["Hear, hear."] With respect to the "Multicooker," it had been adopted by one or two consumers at Newport; but he was glad to say that his Company from the beginning gave no support to it in any way. The appliance was not a success with those consumers who tried it; and before very long they ejected it. He would be glad if the experiment which was set out in the paper could be brought to the notice of consumers as widely as possible, in order to give them an idea of what they might lose if they adopted this system of cooking, which was supposed to be a matter of economy. Mr. Hazell's idea of having a competitition between a gas-fire and an electric radiator was a good one; but he did not quite agree that the best advertisement he could have would be to get into the police court. [Laughter.]

Mr. J. E. Kenshole (Merthyr Tydfil) said he agreed that show-rooms were a necessity in every district. Of course, the smaller undertakings could not hope to get show-rooms such as were to be seen in Swansea, Cardiff, and Newport; but in the majority of cases one that would show off the things effectively could be obtained. With regard to the methods of business in various districts, these differed very considerably; for what was found best in one place did not necessarily apply in another. He felt satisfied in his own mind that in seaside and other residential places where there were boarding-houses, and so on, it did pay to hire-out most gas appliances; but he totally disagreed that it was good policy to hire-out these things in colliery districts. Generally speaking, it was not a paying game. The author said that in showing the appliances one should have marked on them what it was going to cost the consumer to have them fixed. He was in disagreement with this. It must be within the knowledge of the members that to fix (say) a cooker in one house might entail an outlay of 30s. for piping, and in another house the cost might be only 2s. Instead of following the plan that they seem to have adopted at Swansea, his method was to mark the price of the cooker; and if they were asked what it would cost to fix it, the reply was: "We will send a man along, and let you know at once." It was utterly unfair that a consumer where 30 ft. of piping was required and there was possibly a wall or two to go through, should not have to pay any more than one in whose case the piping was already in close proximity to where the cooker was to be fixed. In his own neighbourhood, he knew he would have people coming and saying, "Why is it you charge us the same as Mrs. So-and-So, where the man was working half-a-day, while he was in our house only half-an-hour?" To his mind, it was far better to find out what would be the actual cost; and, if it was determined to do the work at cost price, let it be at cost price to each consumer—not do it at a loss in one case and a profit in another. The only other point he did not quite agree with was where the author said, "Have the price fixed complete shown against each, and be prepared to sell the mantelpieces and tile-surrounds and hearths, if required." Had they the power to do this? If there was an ironmonger in the place who was at all sharp, he would probably raise an objection and prevent it being done. He doubted whether there was an Act of Parliament in South Wales that gave power to sell mantelpieces and tile-surrounds. Most of them authorized the sale of gas-fittings; but he did not think these things could be termed "gas fittings," and so would be rather afraid to do anything of that description.

The President suggested that, as the proceedings must now close, the discussion should be adjourned to a future meeting. There was no doubt, he said, that all places, large or small, should afford a show-room of some kind, as it must be of advantage all round. His own operations were on rather a small scale; but as a rule he took a shop in the main street for a month at the beginning of every lighting season. Anyone who did this would immediately realize the necessity of a show-room, if the circumstances did not in any way prohibit it. Having taken the room, he stocked it well with the latest appliances; and he never failed to clear the whole shop out by the end of the month. They then kept a stock in the show-room at the gas-works; but it had nothing like the effect of the shop in the main street. It satisfied the requirements of those who needed a specified article; but in creating new business it was far behind the other plan. Mr. Jackson had rather anticipated him in his remark as to the Swansea show-room being of value to them all. He himself made use of it to a very great extent; and he often wondered what Mr. Cattell must think of the rather high proportion of people who told him that "They would call again." [Laughter.] He (the speaker) varied the old request of shopkeepers, "If you do not see what you require, ask for it," by saying, "Anything you see in Swansea can be supplied here on the shortest notice." He did not know that it was altogether "cricket;" but it would be understood that being situated as they were, alongside a large town like Swansea, did not lessen their worries. They were continually being asked why they could not do this or that, as "they did it at Swansea." Then, of course, they had to get as near to it as

they could. They could therefore hardly be blamed for doing what they were able, to counteract the disadvantages of being near a large town. Why, they were even asked to supply gas at the same price as Swansea.

Mr. CATTELL pointed out that the type of "Multicooker" to which he referred was not the original form, which was exploded by the British Commercial Gas Association people very thoroughly. It was a new pattern, which was being largely advertised.

[It was then decided that Mr. Cattell's reply to the remarks made in the discussion should be held over until the next meeting.]

THE INFLAMMABILITY LIMITS OF GASEOUS MIXTURES.

A report issued by the United States Bureau of Mines summarizes the results of numerous experiments, from which it appears that the inflammability limits of gasolene vapour are 1½ to 5 p.ct., ethane 2½ to 5, methane 5½ to 14½, natural gas 5 to 12, acetylene 3 to 73, artificial illuminating gas 7 to 21, hydrogen 10 to 66, carbon monoxide 15 to 73, blast-furnace gas 36 to 65. The explosion chamber was in all cases large enough to prevent the cold walls appreciably affecting the result, and the figures are considered sufficiently accurate to possess commercial importance. In all cases the mixtures were at atmospheric pressure.

The effect of compressing mixtures of methane and air to six atmospheres was a slight extension of the lower limit and increased violence of explosion; and with a mixture of hydrogen and oxygen, compressed to 100 atmospheres in a steel bomb, the lower limit was only extended about 1 p.ct. Increase of initial temperature up to 200° C. had very little effect. Mixtures with oxygen in place of air greatly extended the high limit; that of methane being raised to 45 p.ct. A mixture of 9½ p.ct. of methane and 90½ p.ct. of air secured complete reduction to carbon dioxide and water. But if an excess of methane was present, oxidation was not complete; and if increased steadily, a point would be reached when the hydrogen and carbon monoxide produced would not propagate flame. Presumably the higher limits of the other combustibles would be affected in a similar manner; but the lower limits, which were the more important as regards danger of accidental explosions, were not greatly altered.

The above results were obtained with pure air of normal oxygen content, and this had to fall considerably before any noticeable alteration was observed. The low limit of methane applied to an oxygen content of 19 to 21; and the proportion had to fall to 14 before a non-explosive mixture was obtained—20 p.ct. of carbon dioxide, replacing an equivalent proportion of nitrogen, and raising the low limit of methane to 6·4 p.ct.

Electrolysis of Gas-Pipes.

In their column of "Current Topics" last week, the "Yorkshire Observer" wrote: Ever since electric tramways began to run, there have been complaints at different times, and from nearly every part of the world, as to troubles arising from the wasting away of gas and water pipes in the neighbourhood of tram-lines. The trouble arises from the fact that the return current, which should pass wholly by way of the tram rails, does not always do so. The ground in the neighbourhood of the tram rails, though usually of high electrical resistance, carries off certain small quantities of the current; and when these stray currents meet with pipes lying in the ground—such as those employed in the gas and water services—the currents flow along these pipes, leaving them later on to return to the rails, or else take some other path to the electric generating station. Where the currents leave the pipes, the moisture in the ground causes electrolysis to be set up; the oxygen of the moisture combining with small portions of the iron of the pipes. The amount of iron oxidized in this way per hour, or even per day, is very small indeed; but when it continues for months, its effect is gradually felt by the thinning of the pipes. The effect is the greater, the greater the difference of pressure between the far end of the tram line and the generating station. In America, in some of the early tram-lines there was as much as 50 volts difference between these two points. In the United Kingdom the Board of Trade laid down the rule some years ago that the maximum difference of pressure between the end of any tram-line and its generating station should not be more than 7 volts. This has not been found sufficient to entirely prevent electrolysis; and, in addition, the extension of the tram-lines of all the large cities to some distance beyond their boundaries has led to stray currents from one tramway system finding their way into the gas and water pipes of another town or district beyond its boundary. So far, no complete remedy has been found. Coating the pipes is of no service. The only methods that appear to have any chance of success are lowering the pressure at the end of the tram-lines by the aid of negative boosters, and bonding every pipe that is laid in the ground to the tram-line, and bonding every joint to every pipe, connecting the two sides of the pipes together across the joint.

Refractory Products in Germany.—The German Association of Manufacturers of Refractory Products has been dissolved, the "Ironmonger" reports, but some of the members have formed a new Association, with headquarters at Cologne.

PRINCIPLES AND METHODS OF A NEW SYSTEM OF GAS FIRING.

By A. C. IONIDES.

A Paper read at the Autumn Meeting of the Institute of Metals, Sept. 19.

The author's method of heating with gaseous fuel dates from June, 1909, when he was carrying out an experiment preliminary to constructing a calorimeter for testing the calorific value of petrol air-gas. The experiment was to ascertain whether or not the flues could be downwardly displaced in a calorimeter, in order to avoid any possible loss of heat.

At that time silica glass was a new material, and it so happened that a little prior to this date the material was exhibited for the first time at the Royal Institution. A test-tube about ½-in. inside diameter and 6 in. long, and a piece of $\frac{1}{16}$-in. bore silica glass tube about 8 in. long, were acquired. Connecting one end of the silica-glass tube to the petrol air-gas by means of rubber tubing, the author ignited the mixture, and was astonished to find that it burned, and continued to burn, in the upper end of the inverted test-tube. Moreover, as the silica glass became hot, the flame either disappeared or became invisible, and the character of the combustion altered. The changed state of combustion continued indefinitely, and suggested that there should be no difficulty in transmitting a great part of the heat units of the gas to the object to be heated. This experiment may be said to have established the fact that flues may with advantage be downwardly displaced.

The first problem that presented itself in applying this new principle was the difficulty of establishing and maintaining a constant mixture. There are three main variables to be dealt with as regards mixture: (1) The inlet pressure of the air; (2) the inlet pressure of the gas; (3) the variation in consumption of either air or gas that may occur in any given installation.

THE PRESSURE-BALANCE.

This first problem was the most difficult of all to solve, since, for domestic purposes, &c., it was necessary to deal with differences of pressure sometimes involving a consumption of (say) 2·7 c.ft. of gas per hour. Nevertheless, after a lapse of four years, this problem was solved by the construction of a device now known as a pressure-balance. It has been suggested that a better name would be a "mixing-balance;" and the author concurs in this view. This balance consists of a sensitive bell with a requisite length of seal. The inside of the bell is subjected to the static pressure of the gas, and the outside to the static pressure of the air. When the static pressure of the gas increases, the arrangement is such that the flow of gas cuts itself off, and the flow of air is to some extent increased. Likewise, when the static pressure of the air above increases, it shuts itself off, and opens the gas correspondingly, and *vice versâ* when the gas and air are decreased. A similar cycle of operations takes place when the consumption of the one or the other is increased or decreased. Therefore, by such a device, the pressures of gas and air are always held in a constant ratio, whatever the variation of either the inlet pressure of gas or air, or the consumption.

DIFFICULTIES IN HEATING WITH A NEUTRAL MIXTURE.

If a mixture of gas and air be rich in gas, the flame is correspondingly lengthened. On the other hand, if the proportions approach six or seven volumes of air to one of gas (according to the quality of the gas), it is quite possible, given silica or any other good catalyzer, to have no flame at all, but merely surface combustion. Now these conditions present great difficulties in heating with a neutral mixture—one which may be said to be neither oxidizing nor reducing—because of the tendency to local heating. Before this was finally and satisfactorily solved, another three years had passed.

Should a good catalyzer be placed at right angles to a stream of well-proportioned mixture, a glowing disc will be observed. On the other hand, if all catalyzers in front of this stream are avoided, the combustion can be spread out to a very considerable length. The author has proved by experience that with a ¾-in. injector, or even with one of ½ in., it can be spread out to a length of 3 ft. of almost homogenous combustion, by putting the injector into a channel of fire-brick opened at the top. In this way, the heat units can be distributed in a furnace, or boiler, or any other heating apparatus, in a very satisfactory manner.

The third point in the system under description resulted from an observation that the hotter the furnace grew the less was the consumption of gas. By taking into consideration the expansion of gases by combustion, some light is thrown on this phenomenon. What happens if the mixture enters the furnace at (say) normal temperature, 15° C.? Obviously, if it acts as a perfect gas, it will have expanded $\frac{1700}{273 + 15}$ or $5\frac{3}{4}$ times its initial volume.

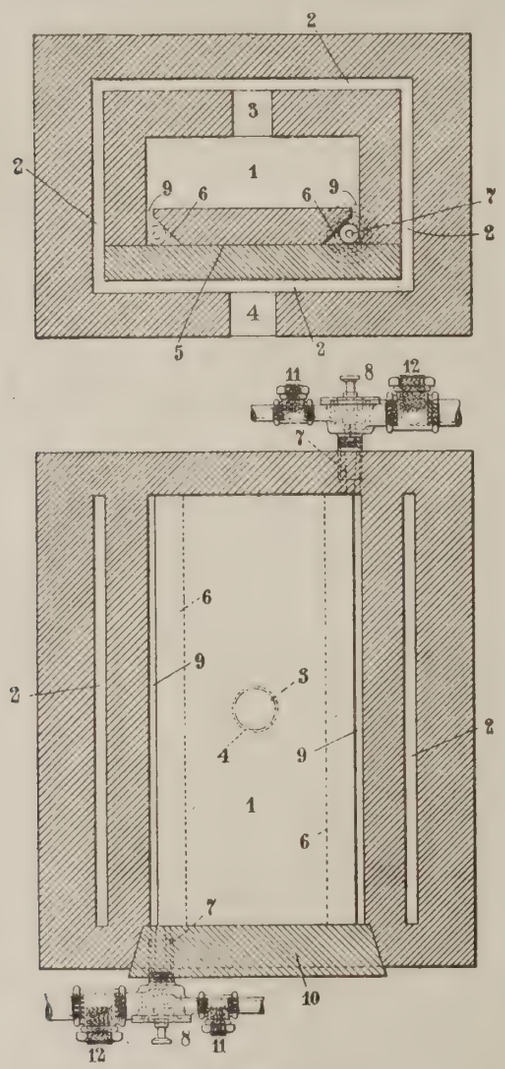
If the waste gases, instead of passing into a chimney open at the top, are displaced downwardly through a contracted exit of predetermined cross sectional area, this will cause a resistance to the flow of incoming gases and provide the elements of the most refined thermostat, without any working parts. In fact, by these

means, the temperature to be maintained can be predetermined with a pencil and a piece of paper.

DETERMINING THE MIXTURE.

The fourth problem was how to determine the mixture. After many trials, it would seem that the simplest plan is to fit an ordinary gas-cock with a piece of copper tubing bent with an easy bend and enlarged at the farther end, and screwed into the injector in such a manner that the enlarged opening at the end of the copper tubing faces the central axis of the delivery-pipe, in this way avoiding stream lines. Now, if a piece of india-rubber tubing and an incandescent mantle be fed with this mixture, the light will indicate the character of the mixture. If the meshes of the mantle are visible, it means an oxidizing mixture. If, however, the mantle is at its most brilliant point, the mixture will be very near the neutral point. On the other hand, if any unburnt gas is seen to escape from the mantle in the shape of a blue flame, the mixture will be an excessively reducing one.

There is a further variable to which reference has not yet been made, and that is the quality of the gas. This can be provided for by external distribution. Let it be assumed that there is a mixing-balance on the air and gas mains entering into a factory, and that all the injectors in the factory are properly calibrated and set for their various functions—brass melting, steel heating, illuminating, &c. When an unwelcome change in the quality of the gas occurs, it is immediately visible on one of the lights. A regulating cock on the air-main (preferably a screw-down tap) will at once put this right, and the whole of the factory will be compensated for this change in the quality of the gas.



Rectangular Barrel Furnace.

A heating chamber 1, having a door 10 at the front, is provided above and below, and, upon the greater portion of its sides, with jacketing flue-spaces 2. The chamber 1 communicates, by one or two central apertures 3, with the top flue space, and the heating elements passing through the aperture, pass downwards through the flues 2, and are finally discharged through the outlet-pipe 4. In the bricks 5 forming the floor there is provided along each of the two long sides a narrow combustion chamber 6, into which a nozzle 7 delivers mixture from a mixing device 8, provided with gas and air-adjusting means 11 and 12. The long combustion chambers 6 each deliver the products of combustion, by a long narrow slot 9, into the furnace-chamber 1. The nozzle is positioned at one end of the long combustion chamber, so that the heating elements, due to their travel along the chamber and their upward motion to escape through the slot 9, enter the furnace-chamber 1, with a diagonal movement parallel to the wall. The gases passing along the wall will tend to turn at the angle when meeting the adjacent wall, and thus a whirling motion of the gases round the walls of the chamber will be created. If the nozzles for the two combustion chambers are arranged at opposite ends of the furnace, as shown, this whirling will be accentuated; the gases being gradually drawn inward across the roof of the furnace-chamber on their way to escape at the outlet aperture 3.

ADVANTAGES OF EMPLOYING THESE PRINCIPLES.

From what has already been said, it will be readily seen that the conditions of conducting heat operations of many kinds on these principles are cleanly, and extremely economical in fuel. The economy is not only in fuel, but also in forgings. There is specially notable the facility with which a reducing or an oxidizing flame can be established and maintained—thus ensuring a consequent absence of scaling. Manufacturers have informed the author that they often have to scrap as much as 90 p.ct. of their steel forgings owing to scaling. The figures given by perhaps the largest users of furnaces for steel forging in Europe, after testing, for five months, a furnace for forging machine-gun barrals, were: Saving, 50 to 55 p.ct. Scaling, negligible. Therefore, it is perhaps unnecessary to state that, even if there were no economy in fuel, there would still be a great saving with regard to steel forgings.

A half-ton billet heating furnace has been made; and the figures given with respect to it were: Gas consumption, 1·3 c.ft. per lb. for full forging heat. Scaling, negligible.

In Table I. is given a list of figures relating to 70:30 brass, melted in a 20-lb. crucible furnace. These figures speak for themselves, and show that in brass melting an economy analogous to that afforded in steel forging can be effected. It might be added that Messrs. Vickers applied this system to a barrel-heating furnace 36 in. × 12 in. × 3 in. inside, which resulted in an agreement to establish the system throughout their works.

As an indication of the correctness of the principles employed, the author would point out that a light worked by means of a pressure-balance feeding a small incandescent mantle will produce

TABLE I.

Date 1915.	Lb. of 70:30 Brass Melted.	From Cold.		Second Heat.		Third Heat.		In the Presence of
		C. Ft. Gas used.	C. Ft. per Lb.	C. Ft. Gas used.	C. Ft. per Lb.	C. Ft. Gas used.	C. Ft. per Lb.	
30 Jan.	12·56	42	3·36	..	..	..	..	Dr. Harker, of the National Physical Laboratory.
2 Feb.	15	51	3·4	..	..	..	..	Mr. J. S. G. Thomas and Mr. Dean Chandler, of the South Metropolitan Gas Company.
3 ,,	16	52	3·25	..	..	..	..	Professor Louis, of Newcastle.
15 ,,	20	66	3·3	..	..	..	..	Messrs. Fletcher, Russell & Company.
24 ,,	16	60	3·75	..	..	..	..	Mr. A. A. Anderson, of the South Metropolitan Gas Company.
26 ,,	19	55·5	2·89	..	..	..	..	Mr. Charles Clare, Mr. Singleton, and Mr. Wilkins, of Fletcher, Russell & Co.
19 Mar.	20	55	2·75	..	..	..	..	Mr. H. J. Yates, Mr. A. S. Braysha w, and Professor Bone
,, ,,	19·75	..	..	40	2·1	..	..	
,, ,,	14	..	..	..	..	27	1·92	
29 ,,	20	58	2·9	..	..	..	..	Messrs. J. & J. Braddock, of Oldham.
30 ,,	20	53	2·65	..	..	..	..	Mr. Hilton, representative of Messrs. J. & J. Braddock.
,, ,,	20	..	..	36	1·8	..	..	
,, ,,	14	..	..	..	..	..	2·08	
19 Apl.	20	56	2·8	..	..	..	..	Messrs. Keith & Blackman (Mr. Angus).
27 ,,	20	..	..	41·8	2·09	..	..	Messrs. Keith & Blackman (Mr. Keith and Mr. Angus).
20 May	19·5	77·5	3·98	..	..	..	..	Mr. Davis and Mr. Twigg, of the Davis Gas Stove Co.
27 ,,	20·50	..	2·83	19·25	2	18·50	1·86	Mr. Twigg and Mr. Gray.
21 July	20	..	..	28·5	1·4	..	..	Mr. Reeson, of the Gas Light & Coke Co.
14 Sept.	20	56	2·8	..	..	..	..	Mr. Arthur H. Kelday, of the Commercial Gas Co.

130 to 150 C.P., with a consumption of under 3 c.ft. per hour of town gas of standard calorific value; whereas, it can be stated, on the authority of Mr. J. G. Clark,* that the highest candle-power light obtainable at this pressure by other systems averages 22 C.P. per c.ft. of gas consumed (variable, of course, owing to the atmospheric burner).

To show the saving to the country that would be brought about by the use of these devices, it may be recorded that:

1.—A 3-in. pressure-balance saves 50,000 c.ft. of gas, or 5 tons of coal, per ten-hour day, as compared with a Brown and Sharp

* See "JOURNAL" for May 4, 1915, p. 279.

furnace, which is considered by all small arms factories to be the best on the market.

2.—One thousand of these devices, in the manufacture of which 240 tons of combined iron castings and steel sheeting would be required, would save in six months—*i.e.*, 180 ten-hour days—the gas distilled from 900,000 tons of coal.

3.—Should the barbarous use of raw coal as fuel, which in itself is most wasteful, be discontinued, and this system be found to be equally economical with all forms of producer gas as with town gas, then in this country alone, where 250 million tons of coal are raised every year, these devices would save half the coal; or, in other words, they would double the industrial possibilities of England.

[At the close of reading the paper, Mr. Ionides demonstrated his apparatus. The temperature of the furnace was read off as 1600° C., and tnat of the flue gases 650° Fahr. During this demonstration, Mr. Ionides mentioned that Prof. Bone did not wish it to go forward that he was present at the demonstration of the apparatus on March 19, as mentioned in the paper. He only came in towards the end of the tests. Mr. Ionides took full responsibility for the figures.]

Discussion.

Dr. J. A. HARKER (National Physical Laboratory) thought that Mr. Ionides, in his attempt to condense into a few minutes what he wanted to explain, had rather forgotten to mention the root principle upon which his experiments appeared to be based. He wished to burn, not the usual mixture supplied, but an explosive mixture which had just approached the point when the velocity of propagation of the flame downwards in the particular mixture which was burning was just balanced by the rate of feed of the mixture upwards in the tube; so that the velocity of the flame remained more or less steady. It was the same as the old lecture-room experiment of a bunsen burner of large diameter supplying a very long tube containing a mixture coming from a jet below. On gradually turning down the quantity of gas, the character of the bunsen flame showed a marked difference according as the gas went through the various phases from a mixture in which only a little air was present to a stage when the explosion point was reached. When the quantity of gas was gradually diminished, the flame descended until at a certain point the cone, which was generally very well marked when the flame was burning in a wide tube, turned inside out, and often hesitated just at the mouth of the tube. If the experiment was carefully done, the flame could be made to pulsate slightly at a desired point. Mr. Ionides in his experiment had managed to do a rather difficult thing—did away with the instability of the flame; and by means of the pressure balance (which he had hardly alluded to in the paper), he had made an apparatus for burning an explosive mixture—a more or less fool-proof thing. As far as he (Dr. Harker) understood the experiments Mr. Ionides showed him two years ago, this seemed to be the gist of the author's work. He had modified a furnace so that, instead of supplying only a part of the air first and introducing the rest of it afterwards, he put all the air he required into his original mixture and made the mixture in such a way that variations in the gas pressure did not cause an extremely unstable flame which jumped about and, if the rate of movement in the mixture outwards in the burner became too small, caused the whole thing to light-back and go out. Mr. Ionides' real advance had been in making an automatic governor which permitted of the safe burning of an explosive mixture in a burner of more or less simple construction. Another thing the author had not alluded to was the very neat device for preventing the lighting-back of the flame which had, however, been described in some earlier papers. Many accessory matters were mentioned in the paper; but the real advance was that the author had designed a comparatively simple outfit for enabling a mixture of any combustible gas to be made with the right amount of air to burn properly—the mixture being independent of casual variations in the rate of the supply of the gas. He did not think it mattered whether there was downward or upward displacement. He congratulated the author on having solved a distinctly difficult problem.

Prof. HENRY LOUIS also congratulated the author upon the brilliant result of his long-continued and careful experiments. He (the speaker) had had the opportunity of seeing them at a somewhat early stage; and the thing that had appealed to him most forcibly was seeing a furnace in which brass was being melted, and the products of combustion coming away at so low a temperature that the water condensed as it left the furnace. This brought the utilization of the heat generated very much further than he had seen before or even thought would be practically possible. From that time onwards, he had watched with very great interest the work that Mr. Ironides had done. As Dr. Harker had said, the thing that had been done was the precise regulation of conditions. It was perfectly well known that if gas and air were mixed and burned so that the maximum heat efficiency was obtained, a necessarily better result was obtained than if the proportions were allowed to vary. Nevertheless, the author had done a great deal of careful work upon this subject and in putting the theory into practice. There were one or two points which appeared to deserve a little elucidation. Tables were given in the paper showing the saving effected by this method; but it appeared that the author had omitted to debit the appliance with the heat consumed in generating the power required to produce the necessary pressure. This was a factor which ought not to be left out of account; and it was a point which required some consideration, especially when it was remembered that the whole of the air required had to be forced into the furnace by positive pressure. With an injector furnace of the ordinary Fletcher type, only a fraction of the total air required was forced in; the rest being drawn in by the air jet. But in the Ionides apparatus a very considerable amount of power was employed in this way; and he would like some information as to how the cost of generating this power affected the results which had been given in the paper. He was, perhaps, looking at the matter from the severely practical point of view of the engineer who had to discuss costs of appliances; and he hoped that a little more light would be given upon the subject. With regard to the air and gas balance, it seemed to him that if air and gas were forced in in regular proportions by means of constantly working blowers, it would be perfectly possible to do away with the pressure-balance. As he understood it, the pressure-balance was designed to equalize small fluctuations—fractions of an inch of water-gauge—in the pressure of the gas. If air and gas were being blown in at 10 lbs. pressure, surely it would be perfectly possible to so regulate the blowers that the balance would not be required at all.

Mr. S. N. BRAYSHAW said that, while (like the previous speakers) he had been extremely interested in the paper and demonstration of the Ionides system, it seemed to him that the author was not very well acquainted with what had been done by others, or with the present state of knowledge on the subject dealt with, or even with the construction and achievements of existing furnaces. The demonstration of an ordinary incandescent mantle against the other two was not a difficult thing to do; and any gas manager in the kingdom, with air under pressure, would be able to produce a like result without any very special apparatus. It was impossible to get perfect combustion in this apparatus, because of the absence of compressed air. There was not enough air drawn along to produce perfect combustion. The point of interest was the apparatus for maintaining constant pressure between the gas and the air; but the claims made for it were too great. It was said that a 3-in. pressure-balance saved 50,000 c.ft., or 5 tons of coal, per ten-hour day. He took it that a 3-in. pressure-balance meant one with a 3-in. main; and it would be a big pull to get 6000 c.ft. an hour through a 3-in. main. He did not think he personally could manage it; it would depend upon the length of the main. But taking it at 6000 c.ft., he thought it was too much to claim that a 3-in. pressure-balance would save 50,000 c.ft. per ten-hour day, or 5000 c.ft. an hour. It would claim serious attention if the author had said 500 c.ft. an hour. Such a claim would want looking into very closely, because it would be a big thing to save 500 c.ft. an hour. Many particulars were given in the paper, and many statements were made; but the only ones capable of discussion and verification were those about melting; and, as his name appeared there, he had no alternative but to make some remarks on this matter, because it ought not to go forth that the figures given in the table represented what could be done by this system commercially. What he had witnessed was brass being melted in a 20-lb. pot; but the manner of making the test and the construction of the furnace were applicable only to a laboratory, and could not under any conceivable conditions be applied to the workshop. It was not commercial melting. The brass was just fused, and poured when just perceptibly above the fusing point. But, even so, the results were disappointing. Under favourable conditions in a workshop 70/30 brass was being melted with 2 c.ft. of coal gas per pound; but he was safe in saying that normally, under commercial conditions, it would require about double what it was possible to do it with in the laboratory.

The PRESIDENT (Sir George Beilby, F.R.S.) interposed that this was the whole point. He admitted that double the amount of gas was required and this was the whole point of the discussion on a previous paper. Why should the works, which usually improved on the laboratory in things of this kind, have gone back in this instance?

Mr. BRAYSHAW said he could go into these points if he had time—matters relating to the construction of the furnace which made it possible to do in the laboratory things which could not be done in the works. The pressure-balance would no doubt be very useful in workshop lighting; but he felt sure that gas-furnaces were not going to be successful without recuperation, which involved varying the proportions of gas and air from time to time. At once the whole automatic principle dropped out, owing to the fact that the different amounts of heat required different proportions of gas and air. He did not think the system did anything that was not already being done better, although he agreed that the pressure-balance was a clever contrivance upon which a great deal of ingenuity had been expended. Nevertheless, it was not the only one on the market. He believed that the Keith-Blackman Company had one which was working very well. Though it had fallen to him to criticize the paper, he hoped some application would yet be made of the large amount of persevering work of which the paper was the outcome.

Mr. W. R. TWIGG (Davis Gas-Stove Company), while associating himself with the congratulatory remarks that had been made with regard to this very interesting system of gas firing, also associated himself with what had beeen said by Dr. Harker and Mr. Brayshaw. In this latter connection he could produce a little information which he hoped would be interesting and of some service. As stated in the paper, he had witnessed a demonstration of the "Captive Fire System," and he was immensely struck with the accurate working of the pressure-balance, and the ingenious nature of the whole device. These tests were witnessed by him on May 20 and 27; and it struck him then that what he saw was not sufficient to enable him to arrive at satisfactory conclusions as to the value of the principle. As Mr. Brayshaw had said, the tests were conducted in a way which could not be compared with practical workshop conditions, under which conditions most of the figures that he had at his disposal at the time were arrived at. Therefore, he thought he would make some special tests under somewhat similar conditions. The tests he had witnessed included the melting of 20 lbs. of brass in a small crucible furnace of the type that had been demonstrated that evening; but the brass was cast into an ingot of a shape exactly to fit the crucible. The products were displaced downwards, and the other points in connection with the "Captive Fire System" were all included. Therefore, he returned to the works and made some tests on a 20-lb. crucible furnace using the ordinary type of air-blast burner associated with the furnace he was responsible for. It was an ordinary burner, and the furnace was of ordinary construction—similar to those in which was being done to-day the melting of brass, gunmetal, cast iron, nickel, and nickel-tungsten alloys. The results he obtained were as follows: On June 26, 1915, 3·05 c.ft. of gas were used per pound on the first heat; on the second heat, 2·1 c ft.; and on the third heat, 1·95 c.ft. On June 28, the respective figures were 3·15, 2·15, 1·9; and on a fourth heat 1·8. On July 15 a further test was carried out, which was witnessed by a responsible member of the staff of one of the large London gas companies. The results then were 3·5 and 1·65. The averages of these results were: 3·23 for the first heat, against 3·13 for the tests given in the table in the paper; 1·95 for

for the second heat, as against 1·88 in the paper; and 1·95 for the third heat. In the only case where a fourth heat was taken, the figure was 1·85 c.ft. per pound. The conclusion he had come to was the same as that mentioned by Dr. Harker—viz., that it did not matter whether they used downward displacement or not, so long ae the melt was carried out in a furnace with an efficiently constructed fire, and with an efficient burner to give a properly aërated flame. In conclusion, he would like to say that, while he appreciated the persevering and painstaking way in which he knew the author and his assistants had elucidated many difficult and tricky points, he could only regret that figures had been put forward as conclusive proof of the statement—which if not made was inferred in the paper—that by means of the "Captive Fire System" brass could be melted at 50 p.ct. less cost than was being done by recognized methods to-day.

Mr. J. G. CLARK (Gas Light and Coke Company) referred to the statement in the paper that he had in the "GAS JOURNAL" asserted that the highest candle power light obtainable at a pressure of 3 to 4 inches—*i.e.*, ordinary gas distribution pressure—was 22 candles per c.ft. He had been puzzling his head to know what he was talking about when (and if) he made such a statement. He was pretty certain that he did not say what the author had made it appear. He hoped he knew more about gas-lamps than that, because the figure was nearer 35 to 40 candles per c.ft., without resorting to any increased pressure beyond what the ordinary mains provided, and without resorting to any appliances external to the lamp itself. As, however, he could not recall exactly what he was referring to on the occasion named, he must take the opportunity of looking the matter up; but he was quite sure he could not have meant what the author had led his hearers to believe. With regard to the photometry tests that had been carried out that evening, he would suggest that too much importance should not be attached to the demonstration, because anybody who knew anything about photometry knew very well indeed that it was an art which had to be practised under very exact conditions; and the conditions existing in the meeting room were far from satisfactory from the photometrist's point of view. Regarding the candle power that could be obtained with the author's air-gas system, some seven or eight years ago he made some experiments on certain air-gas systems, and obtained candle powers he believed up to nearly 50 per c.ft. The author claimed 47 candles for his system; so that, as far as air-gas systems were concerned, we stood very much where we did then. As a matter of fact, we had better systems of using gas for lighting by simple high pressure, giving up to 60 candles per c.ft. simply by using an ordinary compressor. Therefore, they must not go away with the idea that this system was a very great advance over those already in use. With regard to the list of variables which the author had exhibited, too much importance must not be attached to them. For instance, No. 3, "Pressure of Gas Supplied." The author knew that the pressure of gas varied; it must vary just as did the pressure of any other fluid distributed about a district. Pressure must be lost whether it be gas or water; and in electric circuits pressure was also lost in long circuits. Then, as regards maintaining the pressure of the gas, governors for preserving constant pressure were probably as old as the gas industry itself; and one need have very little fear that the pressure of gas would be a difficulty. The author also referred to the pressure supplied by air compressors. Again, this could be controlled by governors, so that there was an absolutely constant pressure the whole time, and not only constant but of any value desired, in spite of the variability of the atmospheric pressure. Unfortunately, we had no control over the barometer; it would go up or down regardless of anything we did; but it was to be remembered that the pressure of gas was always pressure above the pressure of the air. When we spoke of pressures of 3 in., it meant 3 in. above the pressure of the air. The barometer within the next quarter of an hour might go up one-tenth, which was equal to rather more than a one-inch head of water; but the gas pressure would go up at the same time, because it was the difference between the air and the gas which gave what was called gas pressure. Therefore, although one could not control the movement of the barometer, they did not care very much whether it went up or down—it did not affect the gas supply at all. The other variables might also be dealt with in the same way. They were given undue significance.

Mr. L. C. HARVEY associated himself with the previous speakers who had "jumped" on the author. In Mr. Thornton's paper last year, reference was made to the melting of brass in which the gas consumption was given as 2·1 c.ft. per pound; and the author did not do very much better than this. In this, he was rather disappointed, because he had hoped that Mr. Ionides was going to show something that had never been seen or heard of before. He could only hope that the author would in the future be able to so improve his results that he would get down to 1·5 c.ft. or even 1 c.ft. per pound of brass melted. The results in the paper, taken under what had rightly been called laboratory conditions, were rather disappointing, because at the last meeting they had had a similar case in which only 30 lbs. of brass had been melted. These were not practical conditions; and if Mr. Ionides had only got a furnace to melt 200 or 300 or 400 lbs. of brass, and had given some really definite figures of gas consumption for this amount of metal, then we should be able to see where we were, because these small gas-furnaces were relatively more efficient than the large ones. The heat of combustion was generated more efficiently because of the short distance from the orifice of the burner; and the furnace could be heated much more rapidly and economically than the large one in which there was a relatively large combustion space and the gases were travelling at a higher rate. Thus the efficiencies of the commercial furnaces were far below those of laboratory tests. Then the system of downward flow exhaust gases was not at all new. It had been applied over and over again. The difficulty that he had personally found in the passage of gas in a downward direction at the back of the refractory wall, was the impossibility of finding a refractory at the present time which would stand the heat in a brass furnace. It was all right in a steel melting furnace. With 1400° C. inside the furnace, and the gases being passed down the back, unless the wall was of very great thickness, the present refractories would melt. If by passing the waste gases down the outside, heat losses were being conserved, then the efficiency was being improved. But it really rested with the refractories.

Mr. E. P. TAUDEVIN (Richmond Gas-Stove Company) called attention to the reference in the paper to a gas consumption of 1·3 c.ft. per pound of steel heated to a full forging heat. The remarks in this connection would lead one to suppose that the system had been applied to the heating of heavy forgings. He would like to know the type of furnace in which this forging was heated—whether it was cylindrical and of the same form as the billet, because the billet mentioned in the paper was a half-ton billet. He also assumed that the fuel referred to was town gas. British thermal units, of course, did not always cost the same amount of money to produce; and assuming this 1·3 c.ft. referred to town gas, the cost would be 0·039d. per pound of metal. With a modern producer gas furnace of the continuous type (there were many in this country to-day on account of the war), 20 tons of steel billets could be heated with 2½ tons of coal—*i.e.*, gasified coal through the producer. This would work out to 0·02d. per pound of metal, against 0·039d. in the case of Mr. Ionides' system.

The PRESIDENT, in closing the discussion, asked for contributions for publication in the "Proceedings" of the Institute.

Mr. IONIDES, replying to the discussion, first dealt with the point raised by Mr. Taudevin. The type of furnace in which the half-ton billet was heated was exactly the type that had been demonstrated that evening; and if it was desired to know who made it, it was Mr. Twigg. Mr. Twigg had not mentioned that he made the furnace. In stating that he had made comparative tests after he had seen a demonstration of the process, Mr. Twigg did not say that his firm had been in negotiation for a year with a view to acquiring the patents of the system. This was his answer to Mr. Twigg. As regarded Mr. Brayshaw, that gentleman took notes on the occasion of the demonstration mentioned in the paper at which he was present. Would he mind stating the temperature at which the brass was at the third melt?

Mr. BRAYSHAW said he did not take the exact temperature.

Mr. IONIDES retorted that Mr. Brayshaw had made the statement that the brass was only just fused.

Mr. BRAYSHAW said that was so. It was poured as soon as it would pour.

Mr. IONIDES said he accepted this explanation.

A hearty vote of thanks was accorded Mr. Ionides at the close of the discussion.

Gas and Business System.

Subjects connected with business organization, management, and routine are thoroughly dealt with in "System"—a publication, that is to say, whose monthly issues have to cover a very wide field. The September number includes something to interest everybody in business; and there are, among the contents, two articles which call for mention here. In the first place, manufacturers are shown how gas is able to reduce their expenses and secure greater output; a recital of the undoubted advantages in all manner of industries of this form of fuel being accompanied by a very good series of photographs. It may be noted that, so far as manufacturers in general are concerned, the fundamental advantages to be gained by the adoption of gas are stated as: (1) Economy in storage and labour in cartage of fuel; (2) no labour or machinery is required for the cartage of ash and removal of soot; (3) furnaces can be installed in practically any position, thus bringing the workers and the machines in closer proximity; (4) no high chimneys to erect and keep in repair; (5) the automatic fixing of temperatures, thus saving labour in stoking and watching of heating records; (6) increased production, owing to the absolute control of temperature. Coming to actual examples, one firm is quoted as having calculated that the adoption of gas-furnaces in place of solid fuel secured for them the saving of two-thirds of their floor space, full-time labour of a stoker, and nearly one-third of their fuel bill. They secured absolute reliability, abolished soot and smoke, and obtained the same output with less trouble. The second article deals with lighting, and emphasizes the advantages of good illumination in a factory, from both the point of view of safety and the most efficient working. The need for emphasis of this kind has unfortunately been proved by innumerable instances of badly lit workshops; but better methods are being more and more adopted.

Alderman Lazarus Hart, of Ramsgate, whose death was announced a fortnight since, has left £10,000 to the Corporation and an acre of ground, for the purpose of endowing and building ten "Havens of Rest," for persons of any age or sex. Not more than £3000 is to be expended in building the havens, £1000 is to be invested and the income applied to keeping the buildings in repair, and the balance is to be invested and the income divided equally between the ten inmates. The Alderman's two employees, who have been with him for many years, are to be entitled without vote to become inmates of the havens if they so desire.

The Refractory Materials Section of the Ceramic Society will hold a meeting in the Royal Technical College, Glasgow, on the 2nd and 3rd prox., at which the President (Mr. W. J. Jones, of the Ministry of Munition) will take the chair. A number of subjects will be discussed, including the "Refractory Properties of Silica" (by Messrs. H. le Chatelier and B. Bogitch), and the "Testing of Refractories" (by Dr. J. W. Mellor). There will be a visit to the Dalzell Steel Works, a dinner, and a popular evening lecture. The Council have not yet made arrangements for the following meeting; but among papers provisionally promised is one by Mr. J. P. Leather, of Burnley, on "Refractories in Gas-Works, from a User's Point of View."

THE STATUS AND PROSPECT OF GAS LIGHTING.

From an American Point of View.

The President of the Illuminating Engineering Society of America (Mr. W. J. Serrill) prepared an address for this year's "Correspondence Convention," which was arranged to take the place of the abandoned autumn meeting; and prints of the address were available last Thursday.

He commenced by dealing with the progress made by the Society and certain considerations as to its general character and position, and then briefly noticed the work of some of the Standing Committees—maintaining that there was much to be said in justification of the Society, whose main policy was to foster and develop all types of artificial lighting.

He proceeded: I shall make no attempt to urge the advantages of gas lighting, as they are sufficiently set forth by those whose business it is to exploit them. I shall approach the subject from another side—considering briefly, one by one, the obstacles or handicaps which in the past have stood, and which to some extent still stand, in the path of gas lighting, tending to retard its progress, and weaken it in its competition with other illuminants. The discussion will naturally involve some consideration of the prospect of the abatement or removal of these obstacles. I shall not name these handicaps in the order of their importance, nor attempt to classify them from that standpoint, but shall begin with the qualities of the fuel, and follow along (in the natural order) to the policies and practices surrounding the introduction and maintenance of the burners.

Lack of Uniformity an Obstacle to Good Lighting.

The first obstacle to good gas lighting to be considered is lack of uniformity in the fuel delivered to the burner. This does not mean that only one quality or kind of gas should be made all over the country. Generally speaking, any of the gases that are in vogue anywhere are satisfactory, in the sense that existing types of gas-burners may be adjusted to give efficient results with them. It does mean, however, that when burners are once adjusted and in use, it is highly desirable that the fuel thereafter fed to them be kept uniform. It thus becomes a problem for the individual manager in each city or territory that is separately supplied. The modern gas-burner, being a creature of small orifices and delicate adjustments, if it were endowed with the gift of tongues, and with a knowledge of what is expected of it, would cry "uniformity, uniformity" with every molecule of its structure.

In the past, principally two kinds of gases have been general—coal gas and water gas. But in recent years coke-oven gas has become an important factor with many companies. These gases differ from each other in gravity, in heating power, and in air requirements—*i.e.*, the volume of air necessary completely to burn a unit volume of the gas. Many important considerations have led the larger gas companies to equip themselves with apparatus for making two of these gases, and to distribute a gas that is a mixture of the two. Under these conditions, the maintenance of a desirable uniformity in the gas, at all seasons, is not easy.

The effort to maintain a standard candle power as the one standard quality of the gas has been the principal cause of variability in the other qualities. This standard candle power quality, now happily in process of abandonment, but still enforced in many cities by governmental ruling or contractual agreement, can be maintained in the gas as delivered to the burners during the changing temperatures incidental to the seasons, only by varying the proportions of the gases in the mixture, or by processes of enrichment; and these changes automatically cause the variations in the other qualities of the gas which are harmful to the cause of good gas lighting. Candle power as a quality of the gas is useful only on the open-flame burner. It has no value in the incandescent gas-burner. On the contrary, the effort to maintain it introduces effects that are detrimental to incandescent gas lighting. Thus it is seen that the whole course of the development of incandescent gas lighting, since the introduction of the Welsbach burner, has been retarded and handicapped by the enforced adherence to an obsolete and harmful quality in the gas. The least efficient and most wasteful type of burner has been coddled, to the positive detriment of the type on which the future of gas lighting depends. It is one of the bright spots in the future of gas lighting that this incubus is in process of abatement. By common consent, the gas industry is abandoning the candle power standard, in favour of a heat-unit standard, for the gas. In many towns this transformation is an accomplished fact; in others (including some of the larger cities), it may not take place for years.

However, even with this chief source of variability removed, the maintenance of a desirable uniformity in the gas is still a question demanding the constant attention of the manager. When working to a heat-unit standard, a uniformity of air requirement and of gravity is more easily maintained than under a candle-power standard. But it will not maintain itself; it will continue to exist only as the result of unceasing vigilance. Economic and labour conditions demand, for many cities, that a fairly standard quantity—sufficient for the summer output—of coal gas be made, and that the extra quantity for the winter consumption be supplied by water gas, made only during that season. This means a gas of varying qualities; and the problem confronting the manager in such cases is how to introduce these changes with the least possible effect on the incandescent burners—how to maintain a gas calling for a nearly constant air requirement, as the proportion of water gas intermixed gradually increases, and then, after reaching a maximum, gradually decreases with the approach of spring. Some of the ablest minds in the industry are now engaged on the different phases of this question.

Again, unexpected or unforeseen conditions sometimes arise, which tend to destroy uniformity. The present shortage in the coal market, due to the great war, may be cited as an instance, This condition has forced some companies, who have been distributing water gas for years, to swing over to coal gas. In such a change, the incandescent gas lights are bound to be affected; but with the absence of a candle power standard to be maintained. and with a new sense of the importance of uniformity which the modern gas manager possesses, even such changes will produce a smaller detrimental effect upon the gas lighting conditions than formerly.

Another source of variability, of a type that is entirely inexcusable, arises out of the manager's failure to realize the serious effect produced by sending out, even temporarily, an unscrubbed gas, or one containing constituents that normally are removed. It usually arises in this way: Some alteration, replacement, or renewal in the manufacturing plant is undertaken, without any provision being made for the temporary treatment of the gas during the interval that elapses between the taking out of the old installation and the introduction of the new—on the assumption that, for so short a period, a gas that is not normally treated will do no harm. This state of the managerial mind, once quite prevalent, is growing scarce. He knows now that he may, in a few minutes' time, by omitting precautions of the nature indicated, seriously affect his gas lighting business.

The Candle-Power Standard another Obstacle.

The candle-power standard has been an obstacle in the path of incandescent gas lighting, not only by tempting consumers to keep the uneconomical open-flame burners in use, because of the high candle-power of the gas, not only by rendering it impossible for the manager to distribute a uniform gas such as is demanded by the incandescent burner, but also by the psychological effect it has had on the gas manager himself. It has lulled him into a sense of false security. By tradition, thinking largely in terms of the open-flame burner, the enforced maintenance of the candle-power standard, conserving a quality in the gas that is useful only on this type of burner, has emphasized this thought—thus measurably retarding the day, now happily dawning, when the manager faces-about, and for the first time looks squarely in the face the requirements in the fuel that are demanded by a good incandescent gas lighting service. At no very distant period in the past, all gas lighting was by the open flame. Gradually, the incandescent type has replaced the open flame, but quite gradually, and by no means entirely, even to this day. The open-flame burner is indifferent to wide variations in the quality of the gas, so long as the candle power is maintained. How natural, when a candle-power standard is in vogue, to rest comfortably in the thought that by maintaining this standard, one has done his whole duty by gas lighting! Fortunately, for the future of gas lighting, the manager now knows differently.

Uniform Pressure a Requisite.

The demand for uniformity by the incandescent gas-burner is not, however, completely met by the unbroken delivery of a gas of uniform quality. This uniform gas must come to the burner under uniform pressure. To variations in the pressure are due many of the causes of dissatisfaction with gas-burners. The rules of the Public Service Commissions of the several States usually provide a maximum and a minimum pressure permissible at any burner, and an allowable degree of daily variation above the minimum. These provisions are very seldom unreasonable. The gas manager knows that the requirements of a satisfactory lighting service call for a variation considerably less in volume than the variation these rules generally allow.

Strictly uniform pressures are possible only on high-pressure systems, with a governor on each service. Pressures approaching this ideal of uniformity may be obtained on low-pressure systems, such as are the majority of gas distribution systems, by utilizing a system of feeder mains, or a belt-line filled with pumped gas and provided with governor stations located so as to feed into the distribution system at numerous points. Such devices, of fairly recent introduction, enable the manager to maintain more uniform pressures throughout his territory than formerly, and to do so at a less charge for capital investment. The modern tendency to carry higher pressures generally, causes automatically a smaller percentage of daily variation in the pressure at any point in the main system. These causes, in connection with a keener appreciation on the part of gas managers regarding the importance of pressure variations as a factor in the gas lighting service, are gradually removing what has in the past constituted a somewhat serious handicap.

Greater ease in maintaining a uniform gas at the burner is not the only benefit the cause of gas lighting enjoys by the abandonment of the candle-power standard. An additional advantage lies in the smaller quantity of condensable hydrocarbons in the gas. Adherence to the candle-power standard required the maintenance of a fair—sometimes a large—quantity of such condensable content; while compliance with a reasonable heat unit standard permits a material reduction of it. In a properly adjusted burner, the presence of such hydrocarbons in their normal vaporous form

is unobjectionable, as they are completely consumed in the burner; but the seasonal variations in temperature (in the mains underground, in the basements, and in the interiors where lamps are located), whereby the temperatures in these three places vary so that each in its turn may become higher than the other two—these seasonal variations bring about the condensation of part of the hydrocarbons, and its deposit in liquid form. The presence of this liquid deposit, becoming solid or semi-solid when subjected to burner temperatures, has in the past constituted a very serious obstacle to a good gas lighting service. These deposits have been the cause of what is sometimes popularly called a "dirty" gas—now happily disappearing with the exit of the candle-power standard. Compliance with a heat-unit standard permits of a sufficient reduction in the condensable hydrocarbons to prevent any deposit under ordinary seasonal ranges of temperature; and it thus secures greater insurance against those lighting troubles which these deposits cause. Here again we see in process of abatement one of the handicaps under which incandescent gas lighting has laboured.

Impurity of the Gas an Evil.

An evil incidental to the modern forms of gas lighting, which was not so objectionable with the open-flame burner, arises out of the presence of traces of sulphur in the gas, in the form of carbon bisulphide and several obscure sulphur compounds. The ordinary methods of gas purification, which effectively remove all traces of the ordinary sulphur compounds, do not touch these special combinations of sulphur. The burning of gas, however, destroys them, and liberates the sulphur in the form of sulphurous acid. The quantity so liberated into the atmosphere is so small as to be unobjectionable. Indeed, the atmosphere of rooms lighted by gas does not show any higher percentage of atmospheric sulphur than does the ordinary atmosphere of our modern cities, which is charged with this substance to a greater extent than formerly by the combustion of solid fuels in house furnaces and manufacturing processes. However, while these traces of sulphur are negligible as vitiators of the atmosphere, their presence in the products of combustion issuing from gas-burners, nevertheless, produces certain other objectionable effects which gas lighting would like to dispense with. It is a factor in increasing the discoloration of burners and fixtures, and of walls and ceilings, caused by the continual impingement of these products of combustion. If these products were absolutely devoid of sulphurous acid, it is probable that the objectionable discoloration of burners and fixtures would be materially reduced.

The darkening of walls and ceilings, which constitutes one of the greatest handicaps under which lighting by gas suffers, is not caused solely by the sulphurous acid in the products. The presence of this compound, however, is a potent factor in causing it; and the complete removal of the sulphur would materially retard the growth of the stain, and also diminish its intensity. The removal from the gas of these obscure sulphur compounds is, unfortunately, not easy, while it is expensive. The subject is engaging the attention of the ablest chemists and engineers in the industry; and the outlook for the development of a feasible process of purification that will entirely eliminate them is by no means hopeless. If gas lighting is to hold its proper rank in the field of artificial illumination, the accomplishment of this object is important.

The elimination of condensable hydrocarbons from the gas, incidental to the transfer from a candle-power to a heat-unit standard, by removing a tendency to cause smoke, due to clogging of orifices in the burners, is another factor in lessening the evil of darkened walls and ceilings. Not anything that it is in the power of the gas industry to do, however, will entirely remove this objection. Caused by the impingement of atmospheric dust carried by warm air currents, this effect is seen above, or near, any object whose temperature is such as to induce currents of air. The effect is proportional to the volume of the current and the length of time during which it impinges, assuming an equally dusty atmosphere. In so far as the gas-burner generates a large quantity of heat, it cannot avoid the impingement of a correspondingly large volume of the dust-laden air. It can look for relief from this trouble only in a reduction of the quantity of dust and dirt in the atmosphere, or by an increase in the efficiency of light production. In residences (especially those of the better class, in which this evil is more objectionable than elsewhere), there is reason to expect in the future a more dustless atmosphere, due to the introduction of a gaseous house-heating fuel, to the more general use of vacuum cleaners instead of brooms, and to cleaner city streets. In passing, it is worth noting that less dust in the air in residences will have another beneficial effect on gas lighting, in that it will retard accumulations on the burner gauzes, and thus lengthen the period between maintenance visits.

Ignition and Distance Control.

Second only to the handicap of discoloured walls and ceilings (if, indeed, not of equal importance) are the problems of ignition and distance control. These have to do with the factor of convenience—an attribute of prime value. They are recognized as problems of fundamental importance; and there is no need for me to dwell on them in this place. Mechanical and chemical inventiveness have accomplished much in the efforts to solve them; and there is no reason to believe the end has been reached.

Types of Burners Supplied Free.

An obstacle to the full development of gas lighting is a practice still followed generally by gas companies, which is based on a policy which the industry has drifted into, rather than consciously adopted. This is the practice by which the open-flame (the least efficient) burner is given away freely to consumers, while the various forms of the incandescent (the most efficient) burner are only sold at a profit. This practice places a handicap upon the introduction of the incandescent burner, while obviously it is the true interest of the industry, in its competition with other forms of lighting, to facilitate the introduction of its most efficient appliances. It is not difficult to trace the path of this now mistaken policy. When all gas lighting was by the flat-flame burner, gas companies generally adopted the then liberal policy of giving these burners, without charge, to consumers. The expense was small, and the inducement to the consumer thus created was worth while. The replacement of the flat-flame by the incandescent burner has been a gradual process; the adherence to the candle-power standard has, as already explained, kept the flat-flame burner in an undeserved relative prominence; and the gas manager, as in all long-established industries like the gas business, has been conservative. Thus this old practice has continued by virtue of its own momentum. Of course, there was less objection to it when gas lighting, even by the flat-flame burner, was less expensive than competing forms of lighting; but since this margin has grown smaller, or has disappeared, the practice has become increasingly unjustified. And yet it is generally followed to-day. Some progressive companies are now charging for all flat-flame burners, and are shaping their new-business policies so as to throw every inducement in the way of consumers using nothing but incandescent gas-burners; and there is little doubt that gas companies generally will follow suit.

Standard Types of Burners and Mantles.

The subject just considered brings us naturally to another, which is matter for serious concern to gas lighting interests. The gas industry has not shown itself able to control the quality of its incandescent lighting appliances. Inefficient, poorly designed and constructed burners, and flash mantles constitute a very serious evil. And yet it is only within a comparatively recent date that the industry may be said to have considered it seriously. The national societies are now wrestling with the problem of standard designs and specifications of burners and mantles. So far, within my knowledge, no gas company has thought it worth while, in order to control the situation, to make free installations of standard burners or even of standard mantles. In time, competition may bring them to it. Some companies, however, are using all their influence to reduce, or altogether stop, the sale of cheap burners and mantles by storekeepers in their cities, and to encourage their consumers to purchase all supplies from the companies. The fact that gas mantles, of a kind, may be made by relatively unskilled labour, and with plant requiring so small a capital investment, is a detriment to the cause of gas lighting.

Gas Companies, Plumbers, and Gas-Fitters.

Still another question of mistaken policy, inherited rather than adopted, comes to mind. It has to do with the relations between gas companies on the one hand, and plumbers and gas-fitters on the other. In order to facilitate and promote the introduction of gas cooking and other fuel appliances, gas companies generally have long followed the practice of including the connection with the sale of the appliance, and of installing the piping connection by their own workmen. Again, while many gas companies have refrained from installing in new houses at the time of their erection, the complete piping system for gas lighting (leaving this work to the plumbers), still, even in the lighting field, the desire to promote installations has led many gas companies to include in the sale of burners any piping that may be needed to hang the burners. This piping work done by the companies has, as a rule, cost the consumers less than the plumbers can afford to do it for. This practice has resulted in the plumbers and gas-fitters feeling that the gas company underbids them, and injures their market. Instead of every gas-fitter in town being a friend to the gas company and a promoter of gas lighting, as he should be, too often he is indifferent or actively unfriendly. Within a recent period, the unwisdom of this situation has been appreciated; and at least one of the larger companies has, within my knowledge, adopted a policy the reverse of the traditional one.

Poor Illuminating Engineering.

Generally, poor illuminating engineering on the part of the gas company's salesmen may be fairly cited as one of the handicaps to which gas lighting is subjected. Many causes contribute—the salesmen are paid by a method which induces them to increase their sales at any cost, or by a method which induces them to select for sale, not the burners which are best for the location, but those which return the best pay to themselves, or campaigns are undertaken in which only one type of burner is offered, or the salesmen are insufficiently instructed in the principles and practices of illuminating engineering, or to practice illuminating engineering would require a more careful study of the conditions than the salesmen have time for. I am offering no criticism of these causes, as many of them are unavoidable, or at times a given practice is advisable in spite of certain objections to it. It may, however, safely be said that these conditions tend to improvement. Salesmen generally are receiving more thorough instruction in illuminating engineering; they are as a class better experienced in its practice. One of the National Societies has inaugurated an excellent course of instruction for them in this subject. Gas

managers, largely through the influence of our own Society, are more keenly alive to its importance.

During recent years there has grown a conviction in the industry that gas companies should inaugurate systems by which their employees would visit consumers' premises to examine and maintain their gas lighting appliances. Some systems of this nature are in operation at the present time. As a description of these is the subject of a paper to be presented before this Convention, I shall make no further comment, except to say that the growth of a sentiment favourable to maintenance systems is a hopeful sign.

More Street Lighting by Gas Wanted.

It may seem grotesque to include the backwardness of the gas industry in promoting street lighting by gas as constituting in any sense a handicap. Yet I think it is worthy of brief consideration here, as it marks a failure properly to utilize an effective means to publicity, of which gas lighting stands in so much need. Any article appealing to universal popular favour, no matter how excellent in itself, cannot hope to achieve its greatest success minus this indispensable ingredient. Such is the nature of our public; it pays to advertise. And how better can the gas industry advertise its lighting product than by effective, showy street lighting? Ornamental lighting by gas, appropriate for park-ways, boulevards, and the show places of cities, is entirely feasible; and if it is undertaken by gas companies as an advertisement and a means to publicity, and not as a means of making money, there is reason to believe that much of it may be secured. So long as there is a slight or no demand, it is natural that but few properly artistic fixtures should be available.

A condition that, in one way or another, has had a retarding effect on the progress of the gas lighting business may be expressed in the word "rates." Long acccustomed to sell their product at a rate that was uniform under all conditions of use, gas men are at this day only novices at the difficult and delicate art of rate-making. While differential rates for gas are of more importance to the industry in the fuel end of its business, still its slowness in utilizing this efficient means of increasing sales, and reducing costs, has undoubtedly had a retarding effect on the progress of the lighting end. A realization of this fact is spreading rapidly.

Indifference a Serious Obstacle.

I have reserved for the last the most serious obstacle that threatens gas lighting to-day. As might be expected, it is an internal enemy, not one that menaces from without. It is indifference. Is the effort to promote gas lighting, to extend it in the face of active competition—especially in view of the splendid prospects of the fuel end of the business—after all worth while? For one cause or another, this paralyzing doubt is but too common among gas men. In the face of it, how can the gas lighting business expect to progress? Circumstanced as it is, nothing but positive, vigorous, enthusiastic effort, exerted by men who really believe in it, and are determined to make a success of it, can maintain its standing, and secure its healthy growth.

Combination Towns the Worst Enemy.

A potent cause for the unfortunate condition I am now considering, is what is known as the "combination town," where the electric and gas undertakings are controlled in one interest. I feel tempted to say that the combination town is the worst enemy that gas lighting has. In the various combination towns, as they exist in different parts of the country, one of three different policies seems to control: (1) Either the combination company does not actively push either its gas or its electric business, on the ground that having only a limited sum to devote to canvassing, it pays best to spend this sum respectively on the fuel and power ends of its two lines, because no matter what kind of light the consumer may want, "we get it anyhow;" (2) or the company frankly pushes the sale of the electric light alone, alleging that a given sum spent in canvassing in the gas field yields a far larger return in the fuel end, than in the lighting end of the business; (3) or, finally, the company actively pushes both its electric and gas lighting, sending its canvassers out in competition, as though the two were operated separately. There can be little question as to which of these courses is the best from the viewpoint of the most extensive growth of artificial illumination. It is the demoralizing effect on the gas men operating under the first two conditions, and the enervating influence exerted by these men on their fellows in the business, which are deplored. Here are gas men, belonging to Gas Associations, and attending Gas Conventions, who frankly have no interest in gas lighting, or who are completely indifferent as to whether their consumers use gas light or electric light! Is it any wonder that indifference has reared its ugly head among us? When two natural competitors cease to compete, the general cause they both serve is bound to suffer.

But enough! Our catalogue of the ills under which modern gas lighting suffers is ended. It must needs be a robust child to bear up under so formidable an array of troubles. It is a child of sound constitution and tenacious vitality. Many of its infantile diseases have been weathered; some of the obstacles in its path are gradually becoming less formidable; some of the causes that have stunted its growth are in process of abatement. Conscious that it is doomed to maintain a life of struggle and competition, it still faces the future with a smile on its face, and with high hope in its heart. Let us, who have at heart the welfare and growth of artificial illumination, leave with it our best wishes.

MISCELLANEOUS NEWS.

MANCHESTER GAS-WORKS STATISTICS.

The financial history of the Manchester Corporation gas undertaking for the last twenty years is set out with great clearness on a large sheet printed in red and black, which is signed by Alderman Kay (the Chairman of the Gas Committee) and Mr. Frederick A. Price (the Superintendent of the Gas Department).

In 1897 there were 100,647 consumers, a number which has since grown to 192,886—showing an increase in the twenty years of 92,239. The gas-cookers in use have, of course, increased in a much greater proportion; the 4094 in use in the earlier year having since grown to 89,957. Gas-fires belonging to the Corporation were first put in use in 1912, when the total was 2319. This year the figure is practically ten times as large. The mileage of main-pipes has been extended from 750 to 994.

The quantity of coal carbonized in 1897 was 408,064 tons, with an output of gas of 4182 million c.ft. The latest figures are 502,377 tons of coal carbonized, with a make of 5902 million c.ft. of gas. The average price received for gas in the former year was 2s. 3·91d. per 1000 c.ft.; the corresponding figure for 1917 being 2s. 5·42d. As a matter of fact, for two years—1914-15—of the period the average price was just under 2s. per 1000 c.ft.

The manufacture of carburetted water gas was commenced in September, 1897; and sulphate of ammonia was first made at the Bradford Road station in April, 1902. Meter-rents outside the city were abolished in 1898; and in the following year the charge for gas supplied to the near and remote out-townships was made uniform. The charge for hire of gas-cookers within and outside the city was abolished in 1903; and the supply of high-pressure gas was commenced in 1910, about a year before gas-fires were first hired out.

The gross profit in 1897 was £119,223, and the net profit £86,070. This year there was a gross profit of £151,415, and a net profit of £93,781; the total net profit in the twenty years amounting to £2,316,425. A sum of £1,078,340 has been paid into the sinking fund, and £1,063,673 to the city fund for the relief of rates. Then there has been an amount of £255,557 applied to extension of works where borrowing powers were not granted, and to other purposes. The total value of property and assets was £2,072,837 in 1897, and is now £3,546,504. The liability (including mortgage debt) meanwhile increased only from £1,083,331 to £1,227,257. There is thus now an excess of assets over liabilities of £2,319,247.

HORLEY DISTRICT GAS COMPANY'S MEETING.

The Nomination of a Fifth Director.

The proceedings at the recent half-yearly meeting of the Horley District Gas Company were of a protracted character, owing to a long discussion with regard to the appointment of a fifth Director.

The report of the Directors for the six months ended June 30 expressed gratification that the statement of accounts permitted the payment of an increased dividend, and also the placing of £100 to the credit of the suspense account. The profit and loss account showed an available balance of £1414, after providing for the fixed charges; and the Directors recommended the payment of dividends at the rate of 5 p.ct. per annum on the preference stock, 5 p.ct. per annum on the "A" capital stock, and 3½ p.ct. per annum on the "B" capital stock (all less income-tax), which would leave a balance of £485 to be carried forward. In accordance with the Company's Act, the Directors thought it desirable that their number should be increased to five; and they nominated Mr. Frederick James Hazeldine to fill the seat on the Board. Mr. Hazeldine had for some years had experience in gas companies' administration, as a Director of the Godstone District Gas Company, and also of the Petersfield and Selsey Gas Company.

The Chairman (Mr. James Randall) having reviewed the position, a request was made by Mr. H. Mitchell that the minutes of the previous meeting should be read; and this having been done, Mr. A. E. Broadberry said that at the last meeting he asked if he would be in order in proposing that the number of Directors should be increased from four to five, and in nominating Mr. Mitchell as the fifth Director. The answer was in the affirmative; but there was no reference to this in the minutes read. Mr. Chance (representing the Company's Solicitors) remarked that though the matter was discussed it was abortive. Mr. Broadberry, however, pointed out that his proposal had now been acted upon; and he contended that reference to it should appear in the minutes. Mr. Mitchell supported this view; and Mr. Chance then undertook to draft a paragraph which should satisfy the meeting.

This matter adjusted, Mr. Mitchell asked why it was no mention was made of him in the report as a fifth Director, and what explanation the Board had to give for wilfully neglecting to report the wishes of the stockholders to their fellow stockholders. The Chairman said there was no desire on the part of the Board to do anything wrong. They simply took the matter into consideration. Mr. Hazeldine offered himself; and they considered him a desirable person to fill the post. He reminded the meeting that there was no restriction of time; and they did not know how many nominations might be made. Mr. Mitchell's nomination would be taken into consideration with any others that might be made. Mr. Mitchell said his nomination was sent in on May 30 and acknowledged. There was no reason why his name should not appear on the report as well as that of Mr. Hazeldine. The Board had acted in a misleading manner to the stockholders.

Following further discussion, the Chairman said the suggestion had been made that the business of the meeting, so far as regarded passing the report and increasing the number of Directors from four to five, should be carried out, and that the question of the appointment of a fifth Director should be adjourned to some period to be decided by the

meeting. In the interim, the Company should send out a circular to the shareholders intimating the facts. In the course of further debate, Mr. Percy Griffith said the suggestion seemed to meet the case admirably. Ultimately, the report and accounts were adopted, with the exception of the paragraph relating to the appointment of a fifth Director; the appointment of such Director being deferred to the next ordinary general meeting. The Chairman gave an assurance that the Directors would not send out any proxies; and Mr. Hazeldine said it would be grossly unfair not to do so. Country stockholders should be considered.

The meeting closed with a vote of thanks to the Chairman and Directors.

SOUTH SUBURBAN GAS COMPANY'S STAFF.

The Work of a Travelling Medical Board.

The Lewisham Tribunal on Monday last week resumed consideration of the application of the South Suburban Gas Company for three members of its staff—C. Ashley (31), ledger clack; R. J. Fowler (29), ledger clerk; and W. J. R. Cooper (27), chief wages clerk. All three had been rejected on offering themselves for voluntary enlistment; and on May 30 claims which had been put in for them were withdrawn, certificates having been granted by the Munitions Area Recruiting Officer. A Travelling Medical Board which sat at the Lewisham Town Hall passed them Class A; and the certificates having been withdrawn, application was made to the Tribunal, the Company appealing on the ground of national importance and the employees for health reasons. The Tribunal on the 10th inst. referred the cases to the Whitehall Medical Board for re-examination; and it was now reported that Ashley and Fowler had been passed B 2, and Cooper C 3.

The MILITARY REPRESENTATIVE (Mr. H. E. Harry) said he should not, in the circumstances, oppose four months' conditional exemption.

The CHAIRMAN (Mr. F. Mead) wished to ask, not for the purpose of raising a discussion but for his own information, what was the process of depriving these men of the protection cards which had been granted to them.

Mr. WILFRED WASTELL (the Secretary of the Company) said yellow cards were sent—the Munitions Area Recruiting Officer stating that instructions had been given for a female substitute to be provided through the employment exchange.

Mr. HARBY: The certificates were withdrawn because these were found to be A men.

The CHAIRMAN: Yes; the card reads: "The man named below has been found fit for general service. (To Mr. Wastell:) I think you were premature, as the certificates were still in existence.

Mr. WASTELL: I referred to Mr. Shuter (the Tribunal Clerk).

The CHAIRMAN: But they have still their cards.

Mr. WASTELL: For what they are worth! They have had their calling-up notices.

The CLERK: And that was an intimation that the protection card was withdrawn.

Four months' grace was granted in each case—subject to the usual condition.

Mr. WASTELL said all three men were special constables.

THE RECENT STRIKE AT DONCASTER.

Further information now to hand regarding the short strike (which lasted only two-and-a-quarter days) at Doncaster of members of the National Amalgamated Union of Labour, shows that the Special Committee of the Corporation, at their meeting last Thursday week, received an intimation from the Ministry of Munitions that, unless the men returned to work that day, the arbitration proceedings, which were to take place before the Committee on Production the following day in London, could not proceed; it being a rule that such arbitrations are not dealt with while the men are out. The Committee took this point into careful consideration, and also had an interview with the representative of the Ministry of Munitions who had seen the representatives of the Union. Ultimately it was decided (though it is believed by only a narrow majority) that, under the circumstances, rather than have the arbitration proceedings postponed, the men should be allowed to return to work forthwith. The men then held a meeting, and decided to go in.

The number of volunteers at the gas-works had increased on the Thursday; and these workers were kept to their duties till 10 o'clock that night, when they were relieved by the regular employees who had been on strike. The public were pleased to know that the gas workers were back; for the supply of gas had been steadily but surely failing, and it was obvious that unless a much greater number of volunteers were immediately forthcoming the supply would give out. Friday morning saw the whole of the men in the various departments back at their daily tasks.

Upon the arbitration award depends entirely whether the men will receive the 1s. per day extra which they are claiming. The arbitration was conducted before a court, of which Mr. W. W. M'Kenzie, K.C., was Chairman. The case for the Corporation was conducted by the Town Clerk (Mr. R. A. H. Tovey).

When the strikers marched out, the Gas Engineer and Manager (Mr. Robert Watson) was left with his Assistant (Mr. H. J. Carpenter), three foremen, a deputy foreman, Mr. G. Twist, and Mr. W. H. Turner (chief clerk). These, together with Mr. Cundey and Mr. Tully (contractor), rendered invaluable help in keeping things going.

Reduction in Price by the Hornsey Gas Company.—It is announced that from the taking of the meter indexes for the quarter ended June last, the price of gas will be reduced in Hornsey by 2d. per 1000 c.ft.—viz., from 3s. 1d. to 2s. 11d. The price of gas supplied through prepayment meters will also be reduced by 2d. per 1000 c.ft.

STOCKPORT GAS ENGINEER'S REPORT.

In his report to the Stockport Gas Committee for the year ended March 31 last, Mr. S. Meunier (the Engineer and Manager) says that the unfortunate conditions existing twelve months before continued throughout the past year, and were even accentuated during the winter months. The effect upon the revenue may be judged by the following figures, showing what would have resulted if it had been possible to efficiently man the whole of the coal-gas plant available and ready, and thereby reduce the amount of carburetted water gas that was required during the winter months in order to maintain supplies to the district. The total quantity of carburetted water gas made during the year represented the equivalent of 13,100 tons of coal, the residuals from which would amount roundly to 6550 tons of coke, 1000 tons of tar, and 1250 tons of ammoniacal liquor. Taking further into consideration that coke had to be used in this plant to the extent of 5500 tons, it may be reckoned that the cost of the additional coal would have been more than covered by the receipts from residuals; while, though the quantity of oil used per 1000 c.ft. of gas made was reduced as much as possible, it cost £2590 more than for the year 1915-16.

Turning to the accounts, the revenue from gas was £2349 less than for the previous year—no doubt due to the additional lighting restrictions, and the earlier closing of shops. Coke brought in an additional amount of £9485, for an increase in sales of 3572 tons. Tar prices ruled low at the commencement of the year, but gradually improved, though to nothing like the same extent as before the war; the export of pitch having been stopped by the Government, and there being only a limited demand for it on the home market. Ammoniacal liquor brought in £168 less, for about 382 tons smaller sale. Spent oxide, which was an exceptionally valuable source of revenue the previous year, shows a reduction now of £2113, due not so much to a great drop in the value per unit of sulphur as to the fact that stocks were not sufficiently charged to be available for sale. A new item, crude benzol, appears in this year's accounts, and amounts to £616. This process, as in many other gas-works, was installed at the request of the Government. The total increase in revenue from residuals is £7559; and the net increase from all sources is £5076.

On the expenditure side, coal cost £8376 more, cartage £1229, wages £15,684, and materials £1066; while there has been a small reduction on purification, brought about by a slight modification in working. Coal-gas manufacture shows a total increased cost of £11,946. The carburetted water-gas manufacture increase amounts to £2797, made up of oil £2590, and coke £342. Wages are £135 less, due to the plant being closed during the summer to save oil.

Maintenance, owing to increased wages, cost of materials, &c., is up £3639, though every effort was made to carry out only such repairs as were absolutely necessary. For public lamps, the revenue during the year was £2231 down. Rates and taxes have gone up from £10,489 to £14,417, or an increase of £3928.

The total additional expenditure amounts to £23,087. For the first time in the history of the undertaking a loss on working has to be recorded, amounting to £4432; and though this experience is also that of many others throughout the country, yet it is felt that, had all the assistance needed to meet the trying war conditions been fully and energetically given, not only by many Government Departments, but on every side, the balance, however small, could have been kept on the right side of the ledger.

The liquor concentration plant was got to work at the end of the financial year, and is operating very satisfactorily—there having been no difficulty so far in complying with the Government requirements. The difficulty of obtaining sufficient and reliable labour has not yet been solved; and efforts to obtain the return of such of the men who have been relegated from the front to substitution classes for munition work have met with little success, but are still being maintained.

The quantity of gas made during the year, as shown by the comparative statements, was 834,271,000 c.ft., as against 889,808,000 c.ft. the previous year. The make per ton increased from 11,165 to 11,577 c.ft.; while the leakage fell from 10·19 to 8·42 p.ct. From the September quarter the price of gas was increased 6d. per 1000 c.ft.

SUNDAY LABOUR AT THE STOCKPORT GAS-WORKS.

Thirty-Six Stokers before the Munitions Tribunal.

There is every prospect of a settlement of the dispute which has arisen between the Stockport Corporation gas stokers and the Gas Committee, arising out of the recent award of the Board of Trade Arbitrator (His Honour Judge Willis, K.C.). The circumstances of the trouble have been reported in previous issues of the "JOURNAL" [*ante*, pp. 242, 290, 386].

Thirty-six of the men who recently declined to work two separate eight-hour shifts on Sunday, Sept. 2, were summoned before the General Munitions Tribunal at the Manchester Town Hall last Thursday—Mr. A. J. Ashton, K.C., Recorder of the City, presiding—for absenting themselves from duty, and taking part in the strike before the points of difference had been laid before the Board of Trade.

Mr. Walter Cobbett represented the defendants, most of whom are members of the Municipal Employees' Association. Mr. W. Hyde, the Town Clerk of Stockport, appeared for the prosecution.

In applying for an adjournment of the cases, Mr. Cobbett said the point at issue raised the important question whether Sunday labour was compulsory. Some time ago, the men were awarded a bonus of 12s. a week for those receiving 30s. a week, and 6s. for those receiving 40s. and upwards; and on the men's application the award was subsequently varied by reducing the number of shifts from seven to six a week. The stokers afterwards asked for an additional 2s. a shift, with time-and-a-half pay for the hours between noon and midnight on Saturday, and double pay for Sunday work. This was refused. There were also one or two grievances which led to rather bitter disputes. The view taken by the men was that when it became a question of

stopping part of their bonus because they had not worked a whole week, Sunday was reckoned against them; and if they did not work on Sunday, then their bonus was stopped. The men's contention was that their week should be one of six days and not seven. Another question which was still outstanding was that of ventilation. He suggested that the summonses should be adjourned, and that such of the outstanding points of difference which were not being dealt with at a private conference or the impending Board of Trade inquiry (at which the defendants would be represented by the General Secretary of their Union, Mr. P. J. Tevenan), might be dealt with by the Chairman himself.

The Chairman hinted that, as he is a Board of Trade Arbitrator in connection with Wages Awards, the parties might ask the Chief Industrial Commissioner (Sir Geo. R. Askwith) whether he should arbitrate on the matters in dispute.

Mr. Hyde pointed out that the difference all arose through the Corporation applying the terms of the award under agreements made years ago. Sunday labour was absolutely essential at Stockport Gas-Works. The Gas Committee had, however, always been perfectly willing that any differences should be settled in accordance with the conditions in which they and the men worked. The Gas Committee had always complied with the terms of awards and agreements. They were quite willing that the differences should be settled in the way indicated; but he thought it should be understood that the men would, in the meantime, proceed with their work. They had handed in their notices and ceased their work the previous evening (Wednesday).

In answer to the Chairman, Mr. Hyde said the view he took was that the notices tendered by the men should be withdrawn by them, and that, if there was an adjournment, the men should undertake to be at their work on Sunday.

After further argument, Mr. Cobbett gave an undertaking that the men would return to work at 6 o'clock on Friday morning; and he took it that they would work on Sundays just as usual until the question had been disposed of.

The summonses were adjourned until to-morrow (Wednesday); and a conference between the parties was arranged to be held at the Stockport Town Hall yesterday (Monday) afternoon.

QUALITY OF GAS IN WAR TIME.

A Complaint as to Lack of Protection.

A correspondent writing to the "Daily Telegraph" on the subject of the quality of coal gas at present being supplied, makes the following remarks.

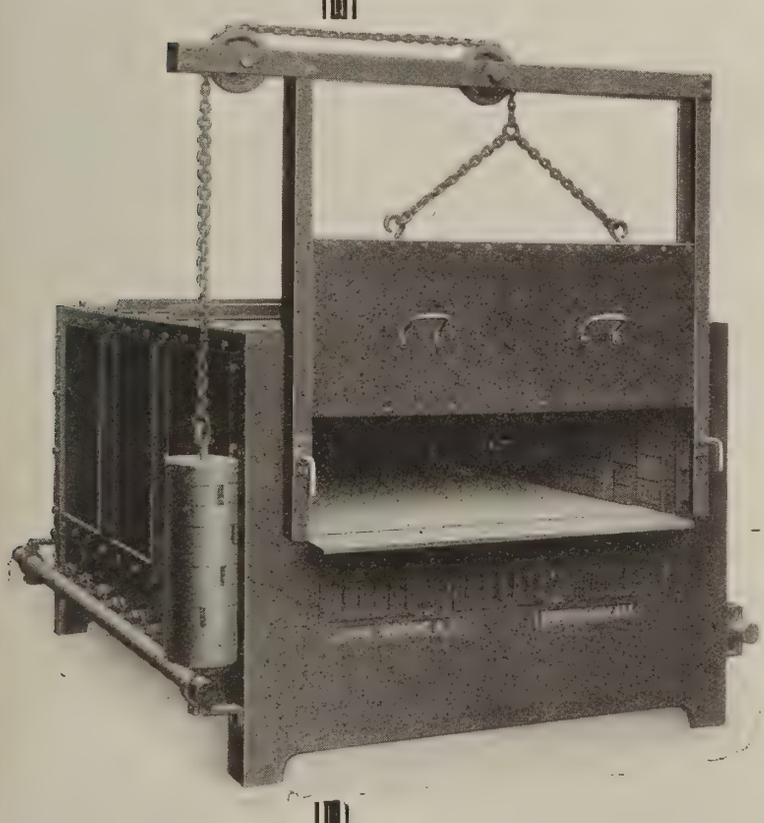
Since the war, an order has been issued that the higher benzenes were to be extracted, for the purpose of making explosives, before the gas was passed to the public. The local authorities were instructed that they should no longer test the gas from time to time for illuminating power, as this could not come up to the standard after the removal of the substances rich in carbon. It appears that in many districts the local authorities have neglected to protect the consumer by insisting that the heating power, at any rate, should be kept at, or near to, the original standard. That is why the amount of inert gas in the gas supplied has in some districts risen to as much as 30 p.ct. The proof of this is that in other districts the inert gas is only 10 p.ct.

The public have received no protection; and as a result the cost of doing work by gas, whether it be power production, lighting by incandescent mantles, heating, or cooking, has greatly increased. I find that, while the nominal price of gas per 1000 c.ft. remained the same, the actual cost of doing the same work was 75 p.ct. more during the first half of this year, as compared with the same period in 1915; the reason being that a far greater volume of gas had to be used, as it was so poor. At times also the pressure has been low; so one did not get the same mass of gas in 1000 c.ft. Now the Company have raised the nominal charge for gas by 17 p.ct. No doubt it was necessary to remove the higher benzenes; but the matter was conducted with complete disregard for the interests of the public. No notice was given, so that ordinary persons could understand that the new gas would not be such good value for money. No advice was issued to the effect that this poor gas would need a much smaller volume of air added to it for its economical combustion, and that, therefore, the air-holes in atmospheric burners, gas-cookers, &c., should be to a large extent reduced by plugs. As a result of this neglect, a large quantity of gas has been wasted in heating a surplus supply of cold air, and gas bills have increased to a serious extent. It is not much use for the Minister of Munitions to request all persons who possibly can do so to use gas instead of other fuel, when complaints about high gas bills are general. Of course, one expects to pay more for gas, but 75 p.ct. extra or more, as it will be with the 17 p.ct. rise in nominal price, is serious.

I am bringing this matter forward because it seems important, in view of the difficulty many have in paying their way at the present time. It is not a very large house that has a gas bill of £12 a year in normal times. If this is doubled, it means the payment of an extra quarter's rent per annum.

In conclusion, the correspondent states his belief that a large proportion of the loss of money and gas that has occurred and is occurring—in spite of the ever-insistent demands for economy—would have been avoided had the authorities troubled to pay proper attention to this matter and to have explained the position to the public.

Stanton Ironworks Company, Ltd.—With a view to centralizing their business in London, the Stanton Company are removing their office, on Oct. 1 from No. 44, Coal Exchange, to Maxwell House, Arundel Street, Strand, W.C.2. Their new telegraphic address will be "Cobbles Eastrand London," and the telephone number "Central 6808." Mr. Arnold Longden, who has represented the Company for some years on the London Coal Exchange, will continue to supervise the Company's interests at Maxwell House.



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ESSEX WORKS . . BIRMINGHAM.

MAINTENANCE OF GAS-LAMPS IN RESIDENCES.

Among the papers prepared for this year's "Correspondence Convention" of the American Illuminating Society was one by Mr. E. B. Myers, on "The Growth and Present Status of Systems Used in the Maintenance of Gas-Lamps in Residences."

The paper pointed out that for some time the majority of the gas companies throughout the country have had in effect well-organized systems for the maintenance of gas-lamps in commercial establishments; and these lamps under maintenance have given better service than those not under maintenance. How much good is accomplished by systematic maintenance has been clearly shown, he says, by a recent lengthy and thorough investigation made by the National Bureau of Standards. The investigation was extended over ten large cities in the States, and consisted in the examination of thousands of gas-lamps in commercial establishments, some of which were under maintenance and some of which were not. The investigation emphasized the common troubles which might be expected to be found with gas-lamps not under maintenance, and brought out clearly how proper maintenance had been effective in keeping other gas-lamps in good condition.

A variety of schemes has been tried by different gas companies in maintaining gas-lighting equipments in commercial establishments. These systems have met with varied success; but, naturally, those meeting with the least success have been eliminated, until now there seems to be one system generally used for this work. Customers may receive the service maintaining the lamps in good condition, including cleaning glassware, making the necessary adjustments, and supplying all repair parts, such as mantles, glassware, &c. It has been found, by experience, that calls made about every ten days are sufficient to keep the lamps in good condition; but, of course, additional calls are made where the case demands it. The work is handled by a corps of men under the direct charge of inspectors—men are primarily expert lamp men and in no sense acting as salesmen. They carry with them a sufficient supply of mantles, repair parts, &c., in addition to the necessary cleaning materials. The charges made for this maintenance depend upon the type of lamp, and vary with the number of mantles per lamp.

The beneficial results obtained by the systematic maintenance of gas-lamps in commercial establishments appealed so strongly to some gas companies that maintenance of some sort was extended to cover lamps in residences; and the results have been no less gratifying. It is noted that schemes for the maintenance of residence lamps installed in different cities, while having the same object in view, must be worked out along different lines.

The earliest attempt to pay special attention to the maintenance of illuminating appliances in the home was simply to extend somewhat the scope of the complaint work already being done by the distribution department of many gas companies. This resulted in what is called "Request Maintenance." By sending the request to the gas company, any consumer could have a man call who would make any or all necessary lamp adjustments free of charge. If any material—such as globes, mantles, or lamp parts—was necessary, it was charged at regular prices. In other words, upon request, labour was supplied free of charge, the only cost to the consumer being for material.

It was soon found, however, that lamps in residences were in little better shape than before. The average customer would not avail himself of the facilities offered. He would probably first endure, and then become accustomed to, poor lighting conditions rather than immediately make the request upon the gas company. It was realized before long that, to make the maintenance scheme effective, it was necessary to take the matter out of the hands of the customer, and have the inspection, adjustment, or repairs made regularly and automatically.

Probably the earliest attempt to put into effect such an automatic system was made at Toronto (Canada), and it has therefore been called the Toronto plan. In this plan, the gas company makes a house-to-house canvass of the city; so that each home is reached three times a year. By this means, every gas-lamp in every residence is examined and adjusted, and the glassware cleaned. There is no charge to the customer for this work. Should it be necessary to replace broken mantles, broken glassware, or other lamp parts, the work is done then and there by the inspector, who carries a stock of replacements in a well-equipped kit. The articles are supplied and installed at regular prices, but no charge is made for the labour.

These inspectors are experienced men, carefully selected for their work. They are familiar with the disadvantages incidental to the use of antiquated, cheap, or inefficient lamps, and are able to make suggestions resulting in the improvement of the illumination—often, at the same time, decreasing the operating cost. For example, a customer is advised to replace open-flame burners with modern incandescent gas-lamps. Where modern lamps are so placed that the illumination is improperly applied, changes are suggested which result in the proper application. Suggestions are made leading to the installation of proper shades or globes, tending to reduce otherwise high intrinsic brilliancy, with the elimination of glare.

Where, for any reason the illumination has decreased gradually, the householder might not become aware of this condition because of the gradualness of the change. Moreover, should one of several gas-lamps become inoperative where all are necessary for adequate illumination, the condition might be endured because of lack of initiative on the part of the householder. When the inspector brings these points to his attention, the conditions are often remedied.

The object of these regular maintenance systems is to anticipate complaints on gas-lighting equipment, and thus insure to the customers continued proper illumination throughout the house. Moreover, these results can be obtained at no relatively high expense. It has been found that in operating the Toronto scheme, the profit made on the sale by the inspector of new lamps, lamp parts, or mantles, considerably reduces the cost to the gas company. This cost is further de-

ON

WAR SERVICE

¶ Though close preoccupation on urgent War Work has necessarily restricted the output of Davis Stoves for domestic use, every effort is being made to cope with the present demand.

¶ Each individual order is receiving all the attention possible under the present difficult circumstances.

The Davis Gas Stove Co., Ltd., 60, Oxford St., London, W.1.

creased if there is taken into consideration the fact that complaint work is often attended to by the inspector on the job which would otherwise have to be attended to by another gas company employee sent on a special visit. Then, too, when the maintenance system is in operation, the cost of ordinary complaint work (ordinarily done free by gas companies) on incandescent lamps is considerably lower than would be the case if the maintenance system were not in force.

Numerous gas companies have adopted the Toronto plan, or similar plans with slight variations. Equally good results have been obtained; and it is claimed that visits made three times each year are sufficient to keep the lighting equipments in the best of condition.

In some localities, it has been thought well to put into effect a somewhat different plan—called the Chicago plan, because of its origination in that city. It is a selective plan; and those customers who signify their desire for the service sign a contract by which lamps are maintained at the rate of 10 c. per lamp per month. Each lamp on maintenance is visited once per month, and is therefore kept in perfect condition. New mantles, lamp parts, or glassware, are supplied at no further expense to the customer. The advocates of this plan are enthusiastic over the results obtained; but it has the disadvantage that all lighting equipments throughout the city are not visited regularly, as in the case of the Toronto plan. In one city using a scheme similar to the Chicago plan, this disadvantage has been recognized, and they have installed an additional maintenance scheme by means of which a house-to-house canvass is made each fall, and every gas-lighting equipment in the city is put in perfect condition—the customer being charged only for the material used.

Gas companies have long been of the opinion, and now the investigations of the Bureau of Standards have proved the fact, that gas-lighting equipments maintained by the customer are not maintained at all; and the author emphasizes a statement made by the Bureau of Standards, as one of the conclusions of their report: "When one recognizes the great advantages of maintenance to both company and customer, it seems that it would be desirable to have this service rendered to all users of gas for lighting."

A canvass of the gas companies of the States, which has just been completed, shows that more and more interest is being given by them to this subject of the maintenance of gas-lighting equipment in the home. In fact, in a large number of cities, residential maintenance systems are now being operated, and in many other cities such systems are in process of being worked-out. The writer of the paper, in conclusion, expresses the hope that all gas companies will take steps to keep gas-lighting equipments in the home in good condition by the prompt installation of systematic maintenance schemes.

A Local Government Board inquiry has been held at Roscrea (co. Tipperary), with regard to the District Council's application for powers to enable them to supply gas or other form of illuminant for public purposes in the town of Borris-in-Ossory.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Sept.* 24.

The demand for pitch is well maintained, and further sales are reported. Shipments are in full swing, and the position of the article is quite firm. Makers' price is not below 45s. per ton net in bulk f.o.b. works for export. Solvent naphtha is in great request, and the price is firmer at about 2s. 5d. to 2s. 6d. per gallon net and naked at makers' works. In other products, there is no change to record.

The demand continues for sulphate of ammonia for agricultural purposes, and a large amount of business is being done on Government terms.

Tar Products in the Provinces.

Sept. 24.

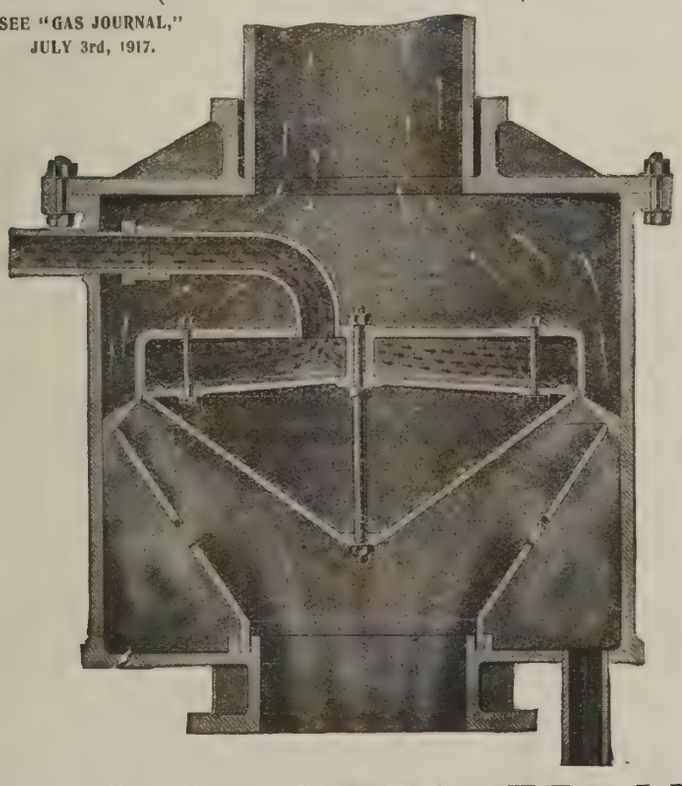
The average values for gas-works products during the week were: Gas-works coal tar, 23s. 3d. to 27s. 3d. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 2s. to 2s. 1d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3¾d. Heavy oils, in bulk, North, 3⅜d. to 4⅛d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The feature of the market during the past week has been the continued and increasing demand in all centres for solvent naphtha, which has been quoted at up to 2s. 8d. per gallon, with every prospect of a further advance. The interesting explanation is put forward that the demand is due to the efforts being made to utilize this product more freely as a motor spirit. The demand for pitch for export to the Continent is still as strong as ever, and 48s. per ton f.o.b. London remains the average price at which these orders are taken. Shipping facilities in London are fairly good, but are not sufficient for the business offered. The Provinces still have to mark time, as no facilities appear to be available; and as the season of heavy production is almost at hand, stocks are accumulating. Nevertheless, provincial holders, in view of the London shipping position, are unwilling to accept the current local quotations unless they are absolutely forced to sell. Cresylic acid maintains the improving tendency noted during the last two weeks, and sellers are asking 2s. 6d. per gallon. In naphthalenes, the refined is dearer. Among crudes, which range from £5 to £14

"TAR FOG" & TAR EXTRACTOR
(FISHER-FIDDES PATENT)
SEE "GAS JOURNAL," JULY 3rd, 1917.



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per ton, the cheaper sorts are difficult to procure. There is practically no business in creosote, apart from the requirements of the Government; and the market is still awaiting some official announcement regarding the price for supplies taken over. Aniline oil remains quiet, and carbolic acid steady—crystals being rarely mentioned. Other products are unchanged. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 3½d. to 1s. 4½d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 30s., Midlands 24s. to 25s.; North 24s. 6d. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 8d. to 1s. 9d.; North 1s. 3d. to 1s. 4d. per gallon; 90-160% naked London 2s. 5d. to 2s. 8d.; North 2s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6¼d. to 6½d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil, 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 5d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 3d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Trade here keeps good. Sellers do not seem very anxious to deliver just now, and prefer to wait the advance in the official quotation next month. This same factor is bringing in a number of heavy orders on behalf of the home agriculturist. It has been suggested in some quarters that the production of sulphate will be insufficient to satisfy the home trade in the coming season; but it is difficult to see any justification for such an anticipation. The licences for export are being reduced still further this month. Probably the amount exported will be less than half the quantity allowed to leave the country last month; and it may be taken for granted that the Government will not permit any shortage to occur. From a national point of view, the policy of looking after the home agriculturist, in preference to catering for the demands of the export trade, is probably a wise one at the present time; but looking further ahead, there are considerable difficulties to be surmounted in the way of recovering the export trade now being lost. And, truth to tell, the manufacturer, unless he is prepared to come out wholeheartedly for educational propaganda in the countries of former large customers as well as among the farmers at home, looks like paying the penalty of his indifference to the trade in general before the war.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 15s.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

Name of the North British Association.—Attention is drawn by Mr. James D. Keillor, of Hawick, to the fact that what he is reported on p. 514 of the "JOURNAL" to have said in connection with the proposed change of name of the North British Association of Gas Managers is not exactly what he did say, which was: "That a recommendation go from this meeting to-day to the Institution of Gas Engineers that it change its name to (say) the Institution of British Gas Engineers and Managers, with a view to the standardizing, or the forming of one grand British gas organization; and with the view to centralizing their organization, and uniting the forces of gas, let us adopt a name such as the Institution of British Gas Engineers and Managers—North British Section, or Scottish Section."

Tamworth Gas Light and Coke Company.—At the annual meeting of the Company (Dr. M. Sculthorpe in the chair), the statement of accounts for the year ended June 30 showed a surplus on the year's working of £2298. The Directors in their report stated that, as the result of the continued increased restrictions in public and private lighting, combined with the earlier introduction of "Daylight Saving," the consumption of gas had further decreased by 3,245,000 c.ft. during the year. The Chairman, in moving the adoption of the report and accounts, said the usual dividend would be paid, although the Company had recently spent £200 in laying down a toluol plant. Out of toluol they were not getting any profit, and they regarded it as the Company's contribution to the prosecution of the war. He explained that they were now supplying gas for motor power, to take the place of petrol. The report and accounts were adopted. The usual dividend of 10 p.ct. on the old shares and 7 p.ct. on the new shares was declared—the same percentage as in previous years.

Gas Workers and Leaving Certificates.—At a General Munitions Tribunal at Leeds, on Wednesday last, the Cleckheaton District Council Gas Department, through their Engineer (Mr. A. L. Jennings), complained that Messrs. Cooke, Sons, & Co., Ltd., had given employment to Sam Phillips, who within six weeks past had been engaged at the gas-works (a controlled establishment), without demanding the production of a leaving certificate. On entering the gas-works, the man had signed an agreement to secure a leaving certificate before going to other employment. He complained of unfitness for his work after a fortnight, and was advised to see a doctor, whose fee would be paid by the department. He became abusive, and threw down his tools and left. The defendants said they had no idea he had been on munition work until a letter came from the gas-works, when they told Phillips he had better go and do his duty. The defendants were ordered to pay £1 and £1 11s. 6d. costs.

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Intensive lamp. Dustproof Bunsen Burner lamp for dusty position.

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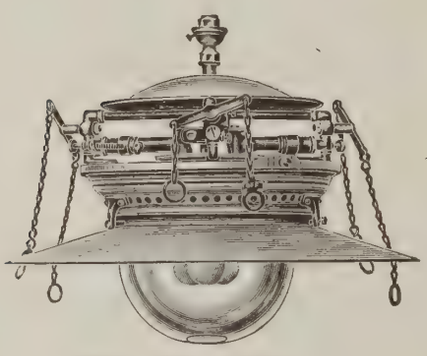
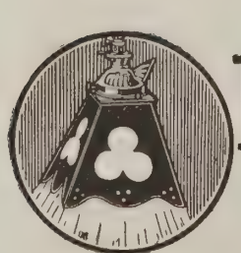
No. 8001 Lamp.

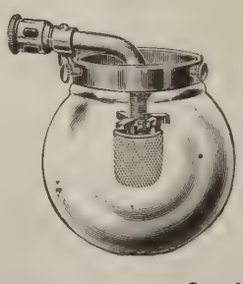
Separate Taps to each Burner.

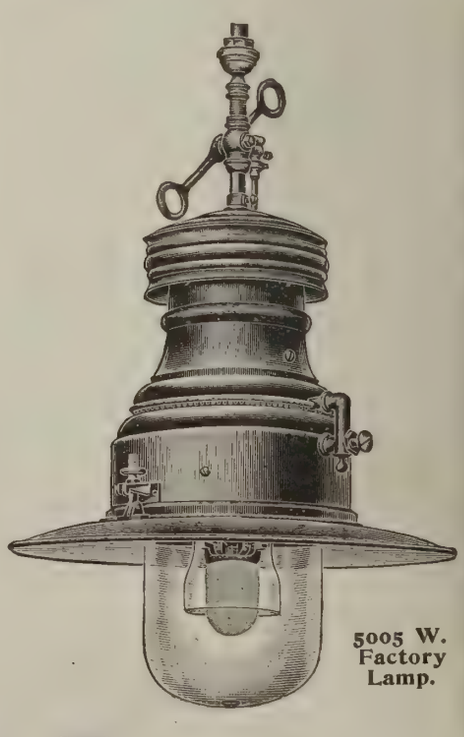


2003.—Short Head Lamp.



Podmore's Protector





5005 W. Factory Lamp.

See Advertisement on facing page

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is still irregular; but the output is rather larger, and is, on the whole, better taken up than it was. In steam coal, the demand is higher for the better qualities. Best Northumbrian steams are firm at 30s. per ton f.o.b.; second-class descriptions are quiet at about 25s. 6d.; and there is an abundance of small steams at from 18s. 6d. to 20s. 6d. In gas coal, the demand is full for best kinds, and increasing for the other classes. Best Durham gas coals are firm at 25s. f.o.b.; second-class qualities are 23s. 6d.; and "Wear Specials" are from 27s. to 30s., with a strong inquiry. The output is fair for the season; but the "control" is still felt a little in the diversion of trade. The high freights have some effect; Tyne to London, gas coal, being at the high rate of 19s. 6d. to 20s. Home consumption of gas coal is now steadily increasing week by week, and, generally speaking, Durham coal is in demand full enough to give the collieries steady work. Coke is fairly firm; good gas coke being from 30s. to 32s. per ton f.o.b. Stocks are rather heavier at some of the inland gas-works. More is being exported in other cases; but steamers are scarce, and the freights are based on 45s. to Dunkirk and neighbouring ports.

Price of Gas at Whittington.—The Whittington Gas Company (Derbyshire) have given notice that, owing to the increased cost of coal, materials, and labour, they are compelled to increase the price of gas as from Sept. 29. The price of gas supplied by ordinary meters for lighting, heating, cooking, and for manufacturing purposes will be raised by 3d. per 1000 c.ft. For prepayment meters, the discount of 1d. per 1000 c.ft. will be discontinued.

Brighouse Wages Question.—The Board of Trade arbitrator's award, in the application of the Brighouse Corporation employees for more pay, having been that the wages should remain at the existing standard, the employees, through the Workers' Union, only a fortnight after the announcement of the award, have put forward a claim that the pay should be increased by no less than 15s. per week. In the circumstances, the Corporation have decided to do nothing but forward the correspondence to the Chief Industrial Commissioner.

Meter-Maker's Patriotic Desire.—At a meeting of a Munitions Tribunal in London, an appeal to be placed on more direct munition work was made by a man who said he had been working for eighteen years for a firm of gas-meter manufacturers. Though it was a good job, he felt he could not remain making gas-meters when aeroplane manufacturers so badly wanted men of his type. Money had nothing to do with the appeal, which was a matter of conscience. The Chairman assured the applicant that making gas-meters was munition work. The firm's representative said the contracts were urgent, and the man could not be spared. He was, however, sincere in what he asked for; and if he stayed, the firm would place him on work which would appeal to him as more direct war work. Applicant agreed to return.

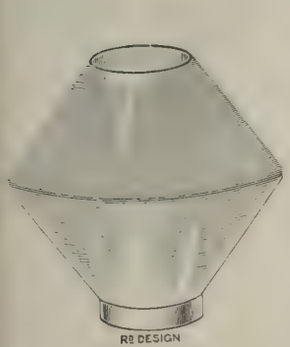
Wandsworth Company's Increase in Price.—The Wandsworth, Wimbledon, and Epsom District Gas Company announce that the price of gas will be raised as from the Michaelmas quarter as follows: Wandsworth area, 2s. 6d. to 2s. 10d. per 1000 c.ft.; Wimbledon, 3s. 1d. to 3s. 5d.; Epsom, 3s. 6d. to 3s. 10d. The Company state that the increase is rendered necessary by war conditions, including a great advance in freights, higher cost of materials, and war bonuses.

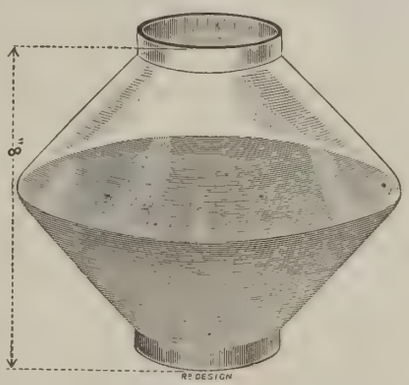
Gas-Driven Vehicles and an Alleged Nuisance.—Ratepayers and residents of the Marine Avenue, Westcliff, have been petitioning the Southend Corporation about an alleged nuisance, which they complain arises in connection with the supply of coal gas to hackney motor vehicles at certain premises in that thoroughfare, and about the risk of fire and explosion. The Health Committee had a report from the Medical Officer on the subject; and as a consequence, express satisfaction that no danger to health exists in connection with the supply of gas to the vehicles. Inasmuch as the matters complained of are not such as to constitute a nuisance under the Public Health Acts, the Town Clerk has been instructed to so inform the residents. Nevertheless, the matter has been referred to the Watch Committee.

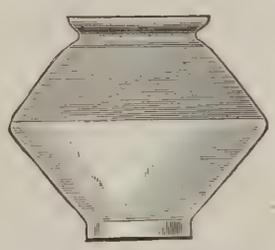
Increase in Price at Smethwick.—In view of the great increase in the estimated expenditure for coal, wages, and other items for the current year, the Smethwick Gas Committee have decided that the price of gas for motive power and manufacturing purposes shall be increased from Sept. 30 as follows: For quantities up to 3,000,000 c.ft., 2s. 2d. per quarter per 1000 c.ft.; for quantities over 3,000,000 c.ft., 2s. per quarter per 1000 c.ft., less 5 p.ct. discount for prompt payment. The existing prices, which averaged 1s. 8d. per 1000 c.ft., have been insufficient to cover the actual cost. It is not proposed at present to alter the prices for lighting and domestic purposes. The position in connection with the coal supplies is stated to be very unsatisfactory; and the Committee have found it necessary to use coal from stock. Strong representations have been made to the Coal Controller on the matter.

Reduction of Bonus without Consent.—At a General Munitions Tribunal at Halifax last Wednesday, the Campbell Gas-Engine Company had to answer two summonses, alleging that they had reduced the bonus to labourers in their employ without the consent of the Ministry of Munitions. Mr. E. Booth, for the defence, applied for a month's adjournment, in order that Counsel might be instructed, and a thorough investigation arranged. The questions involved were of far-reaching importance, and had bearing on the relative remuneration of skilled and unskilled workers. The defendants had pointed out to the Ministry of Munitions that proceedings in the cases would be likely to cause a serious industrial upset; but the Ministry had decided not to withdraw the summonses. Mr. A. S. Comyn Carr, on behalf of the Ministry of Munitions, opposed adjournment, and said the reductions complained of occurred in February. The firm's attention was drawn to the matter; but they delayed replying until after the proceedings were commenced. The hearing was adjourned to Oct. 6.

A. E. PODMORE, trading as
A. E. PODMORE & CO.,
Patentees & Manufacturers, Gas Lighting Specialists,
34, CHARLES STREET, HATTON GARDEN, LONDON, E.C. 1.
Telephone: 6600 Central. Telegrams: "Promerope, Smith, London."





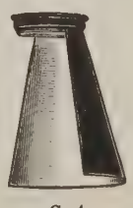

Patent.

CAN BE USED WITHOUT CHIMNEYS.

METAL REFLECTORS.

G. 3.

G. 7.

G. 5.

G. 4.

AMERICAN Upright Burners.
" Swan-neck Inverted.
" Vertical Inverted.
K Angle-Inverted Burners.

Renewal Parts for LUCAS INTENSIVE LAMPS and MANTLES.

SYDNEY LAMPS. Glass.
K Mantles. IVEX Mantles.
Glass for 300-C.P. Petromax Lamps.

See Advertisement on facing page.

Wages at Burnley.

Recently there was a general concession of 9s. per week on pre-war rates to Burnley Corporation workers; and it is in regard to the interpretation of this award to gas workers that there was nearly a stoppage of the Burnley Corporation Gas-Works a fortnight since. Fortunately for the public, the men were got to postpone action for a week. Had they carried out their decision to "down tools," things in the town would have been serious, for the department has not sufficient storage capacity for one day's consumption of gas by the public. The Corporation, having in view the fact that gas workers normally worked seven shifts, decided to pay the Arbitrator's award of 9s. over and above the earnings for the seven shifts at pre-war rates. The men claim that the 9s. ought to be paid in respect of six days, and that for Sunday labour an extra bonus of 2s. 3d. should be paid, making a total of 11s. 3d. They arrive at the 2s. 3d. amount in the following manner: $\frac{1}{8}$th of 9s. is 1s. 6d., and Sunday labour reckoned as time-and-a-half accounts for 9d., making 2s. 3d. A special meeting of the Committee considered the letter of Mr. Burrows, the Secretary of the Gas Workers and General Labours' Union, and arranged for a joint meeting. The Gas Committee, it was explained, had no feeling in the matter, and were quite willing to take steps to obtain the opinion of the Arbitrator on the particular point raised by the gas workers. The men's representatives agreed, as stated above, to stay action for a week. Work proceeded as usual during the week-end; the men loyally carrying out the arrangement made with the Committee.

Automatic Lighting in Edinburgh.—Messrs. Alder and Mackay's "pressure-wave" system of lighting and extinguishing public lamps was tried in Edinburgh on a limited scale last winter, and was found successful. It is now intended to apply the system to an extended area in the same district. Every alternate lamp is to be fitted with the apparatus—making, with last year's 65 lamps, a total of 338. The lamps are to be extinguished at 10 o'clock.

Price of Gas at Maryport.—At the monthly meeting of the Maryport Urban District Council, Mr. R. W. Watson (the Chairman of the Gas Committee) gave notice of motion that the price of gas be increased 5d. per 1000 c.ft. At present it is 3s. 4d. He said this course had been rendered necessary by the losses of the last two years. They were still selling at pre-war rates. The Manager (Mr. A. T. Harris) had effected great economies, and, in spite of the higher price, saved £628 on the cost of coal used. If coal had remained at the same figure, the saving would have been £903. The yield per ton of coal was over 13,000 c.ft., against 11,000 c.ft. the previous year. Against this, they had to put a considerably increased cost for repairs, renewals, rent, rates, and taxes, and new plant paid out of revenue; and they showed a loss of £446 on the year's working. Had the works, however, been operated on the same lines as during the previous year, the loss would have been over £1000.

Suicide in a Gas-Oven.—The divorced wife of Mr. Huntley Wright (the actor), who had been employed as a clerk at the Ministry of Munitions, was found dead at her flat, with her head resting on a cushion inside the gas-oven. Medical evidence showed that she had suffered from alcohol and the morphia habit.

Sligo Gas Lighting.—The administration of municipal affairs in Sligo has recently been the subject of official investigation; and among other disclosures that followed, was one as to the non-payment to the local Gas Company of their account for public lighting. At a special meeting of the Corporation, when the matter was referred to, the Mayor (Mr. D. M. Hanley) said he supposed all they could do was to explain the position of affairs, and state that the Company would be paid as soon as possible. Meantime, it was decided that the usual winter lighting of the town should be proceeded with.

The Loss on the Goole Gas-Works.—The Goole Urban District Council have considered at a special meeting in committee the statement of accounts referred to on p. 526 of last week's issue, which showed a loss for the past year of £1576. It was reported that the Sub-Committee's recommendations regarding the works, on which there has been a loss of over £4000 in two years, had been received. This stated that, apart from the abnormal conditions prevailing, the present out-of-date plant was extravagant and wasteful, the cost of labour was high, and the present reduced staff could not be curtailed. There was a likelihood of a further decrease in the consumption of gas, owing to the restricted public lighting, the curtailment of shop hours, the increasing number of empty houses in the town, and the use of electric light. On the Sub-Committee's recommendation, it was decided to increase the price of gas from 3s. 9d. to 4s. per 1000 c.ft., and to reduce the candle power from 16½ to 15, which would be a further saving of 2d. per 1000 c.ft. The price of coke was advanced from 18s. 4d. to £1 per ton.

The Sheffield Gas-Works Explosion.—The inquest following on the fatality which resulted from the explosion on Aug. 27 at the Grimesthorpe works of the Sheffield United Gas Company, was concluded last Thursday [*ante*, p. 479]. It was stated that the deceased, Ernest Mottershead, a private in the working party of a Lancashire battalion, was working near the meter-house when the explosion occurred. Almost immediately two huge sheets of flame spurted forth and there was a second explosion. Workmen in other parts of the yard rushed to the spot, and saw three men crawling on their hands and knees through the flames. A valve-man named Joseph Allen said that he was in the meter-house three minutes before the explosion happened, and the place was then in order, and everything working all right. He had not got forty yards away when the accident happened. The meter-house was soon a mass of flame, and an adjacent holder was pierced by flying *débris* and set on fire. He went to assist in shutting off the gas. It was stated that the explosion was due either to an excess of gas causing too much pressure in the seal, or some unknown reason. A verdict of "Accidental death" was returned.

BRASS WORK

WE HAVE A GOOD STOCK OF TAPS, &c.

Send us your enquiries.

SAWER AND PURVES

(Branch of Meters, Ltd.)

MANCHESTER. NOTTINGHAM.

Benzol Distribution After the War.

A good deal of uneasiness is, "says the "Glasgow Herald," being manifested in certain motoring quarters "regarding the utility of benzol as a competitive fuel against petrol when the whole output of the present war sources of supply shall become available after the war comes to an end. At the present time private users of motor spirit are in the hands, and at the mercy, of the importers, so far as prices are concerned. The importers are in a position to demand any price they think fit; and, so far as can be judged, the same condition of things will continue after the war, unless some competitive fuel comes to the rescue. This fuel motorists had begun to hope would be found in home-produced benzol. When war broke out, some 12,000,000 gallons of this spirit were distilled in the United Kingdom, chiefly as a bye-product of the manufacture of blast-furnace coke. But inasmuch as one of its constituents (toluol) is one of the ingredients used for high explosives, the Government have financed the erection of large works for the sole production of the spirit from coal; and at the present time the total output is said to reach not less than 40,000,000 gallons per annum. All benzol in the United Kingdom is now controlled by the Ministry of Munitions; and it is alleged that when peace returns Government control will be continued. Further, it is stated that arrangements have already been made whereby the output will be under the control of the Anglo-Persian Oil Company, in which the Government hold a controlling interest, and that its distribution will be in the hands of the British Petroleum Company, who will act in future as distributors for the Anglo-Persian output. In this arrangement the motoring fraternity see a malign attempt to place the competing fuel in the hands of the enemy. But it is not clear that any justification for this suspicion exists. The Directors of the Anglo-Persian Company are not in the petrol importing companies, as Directors at least; and the concerns in which they are interested—other than the Anglo-Persian—do not produce motor spirit to any extent. Moreover, the ultimate arbiter is the British Treasury."

Perils of Unlit Streets.—At last Tuesday's meeting of the Newton-le-Willows District Council it was announced that at a meeting of the representatives of the employees of the engineering works of Earlestown and Newton a resolution was passed, and a letter sent to the local police authorities, saying the men would refuse to go to work at nights unless some light was allowed in the streets, owing to the many serious accidents which occurred in the excessive darkness of last winter. The Lighting Committee of the Council passed a resolution authorizing the Gas Engineer to light a hundred street-lamps with tops darkened, and to let the police take proceedings if not satisfied.

Quality and Pressure of Gas.—The Town Clerk has reported to the Swansea Corporation with regard to the efforts made by him to obtain a Departmental Inquiry into the Gas (Standard of Calorific Power) Act, 1916. He read a letter from the Board of Trade intimating that the Board and other Government Departments concerned have requested the Fuel Research Board to conduct an investigation and inquiry, and to advise them as to what is the most suitable composition and quality of gas and the minimum pressure at which it should be generally supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used.

Coal Gas for Motors.—Last week's issue of "Light Car and Cycle Car" wrote: That the use of coal gas is making remarkable developments is visible to the eye in the number of vehicles now running on it. Less apparent, but none the less important, is the attention which is being bestowed upon the subject by gas undertakings, scientific institutions, and by private research. It is always unwise to forecast; but it really looks as if coal gas, far from proving merely a war-time expedient, has come to stay as a permanent fuel. Perhaps, after the war, instead of asking for a can of petrol, we shall have to choose between petrol, shale spirit, benzol, alcohol, or coal gas—for each of these various fuels is in a state of important development. A writer in the "Daily Chronicle" says: The car with coal gas as a motive power seems to be coming. It has been well and successfully tested in the warm summer days. But remember the chill of winter! No gas manufacturer has yet succeeded in eliminating naphthalene; it is always present. . . . How will the little inlet-pipe of the motor-engine fare when naphthalene dams it tight?

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 19.]

Nos. 12,922—13,263.

DUERDEN, G. E.—"Gas-containers for motor-vehicle propulsion." No. 13,232.

FLETCHER, F. T.—"Generating illuminating-gas." No. 12,990.

HUMPHREY, A. H. "Gas-burners." Nos. 12,996, 12,997.

JAGGER, R. C.—"Gas-containers for motor-vehicles." No. 13,229.

KIRBY, A.—"Burners for pitch." No. 13,205.

LACROIX, P. A. M.—"Photometers." No. 12,976.

MOORE, A.—"Supporting and carrying gas bags or containers for motor-vehicles." No. 13,161.

RICHARD, J.—See Lacroix. No. 12,976.

SCOTT, W. C. H.—"Gas-container attachments for automobiles." No. 12,944.

SOUTH METROPOLITAN GAS COMPANY.—See Kirby. No. 13,205.

SPIVEY, F.—"Portable gasholder for use with motor-vehicles." No. 13,001.

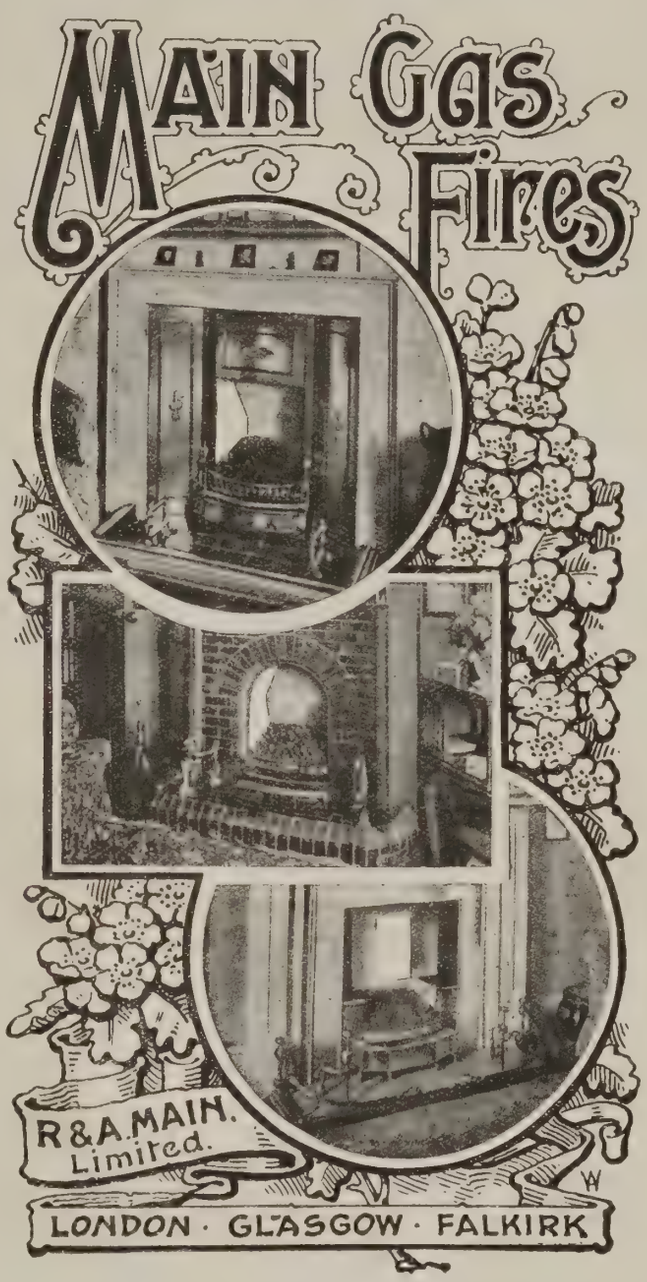
TOMLINSON, J. D.—"Supporting and carrying gas bags or containers for motor-vehicles." No. 13,161.

TURNER, W. DE C.—"Gas-producer." No. 13,041.

WALLWIN, J. M.—"Mixing air and gas supplied under pressure." No. 13,125.

WILLIAMS, P. F.—"Gas stoves or radiators." No. 13,075.

MAIN'S NEW FOLDER IS READY.



Supplies of this handy List will be sent upon application. It contains the latest information and prices of the popular "Main" Fires, Radiators, &c.

Place your Season's Orders early.

We have commenced our deliveries.

R. & A. MAIN, Ltd.,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

The Grangemouth Gas Commissioners have increased the price of gas from 4s. 7d. to 5s. 5d. per 1000 c.ft.

The Coroner's Jury returned a verdict of "Wilful murder and suicide," at an inquest on the bodies of Patrick Clearey and his daughter, who were found dead with the room full of gas. The windows, fire-place, and all crevices were fastened up with fresh putty.

The accounts to be submitted at Thursday's meeting of the Alliance and Dublin Consumers' Gas Company contain an item showing that an amount was received last half year of £7605 as "cash compensation awarded by the Government in respect to losses by fire and damage to property during the Sinn Fein disturbances in April-May, 1916."

A tablet has been placed in the Tiverton Gas-Works, recording the fact that the works were bought by the Town Council in 1896, and that the first Chairman of the Lighting Committee was the late Alderman John Thorne, J.P. It was largely due to his ability and devotion to public duty that during his twenty years' chairmanship the loan for the purchase and improved equipment of the works was repaid out of the profits. At the unveiling, it was declared that Mr. Thorne's services in initiating and carrying through the purchase of the undertaking, and his part in the management and improvement of the works, were services which would never be forgotten in the town.

The Directors of the Bentham Gas Company have notified consumers that as from the middle of this month there will be a temporary increase in the price of gas of 5d. per 1000 c.ft.

A verdict of "Suicide while of unsound mind" was returned last week, at an inquest in Leeds on the body of Eleanor Longbottom, who died from gas poisoning. She had been worried over her work and depressed. She was found in bed unconscious, with a piece of flexible tube attached to the gas-bracket, the other end lying on her chest.

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

STOCK MARKET REPORT.

The Stock Exchange has had a rather humdrum sort of week. A good feature, however, was that from a quiet and rather shifty opening day things very slowly but steadily improved in tone until on Friday the news of Sir D. Haig's great push on the Ypres front arrived and brightened up everything at the close.

The gilt-edged market was rather uneven. Home Government issues were handicapped by uncertainty as to the country's financial intentions in the immediate future; but the War Loan maintained steadiness. Home Rails had a better time, feeling more hopeful as to probable *post-bellum* conditions.

The Foreign Market was stronger. In addition to Russians, there was firmness in French, Scandinavian, Chinese, and Japanese. Argentines were a little better, and South Africans made some advance. In Miscellaneous, Rubber, Iron and Steel, and Textiles were in demand, Oil made some recovery, and Breweries attracted notice anew.

Business in the Gas Market was more animated than it had been for a long time past, and showed quite a big aggregate of transactions. A large share of these was in Primitivas, which had a renewed outburst of popularity—especially the ordinary shares, which slightly advanced in quotation. Imperial Continental, with a closing mark of 88, improved 2 points, and the debenture stock did the same. Some prices were hard to follow—*e.g.*, jumps from 85 to 89 and from 93 to 100, without change of quotation. But the true inwardness of bargains is not public property. The Money Market was firm.

Bargains done for cash during the week were as follows: On Monday, British debenture 68, Commercial 4 p.ct. 70½, Continental Union 39½, Gas Light ordinary 71, 71⅛, 71¼, 71½, 71¾, 72, ditto maximum 57⅛, ditto debenture 56, 56¼, Imperial Continental 86, 87, ditto debenture 65 7/16, 65½, Primitiva 42s. 6d., 43s. 9d., 44s. 4½d., 45s., 45s. 7½d., 46s. 3d., ditto preference 61s. 3d., 62s. 6d., 63s. 9d., South Metropolitan 72, 73½, 73⅞, ditto preference 95¼, 95½. On Tuesday, Brentford "B" 78, Gas Light ordinary 71⅛, 71½, 71¾, 72, Imperial Continental 86½, Primitiva 46s. 3d., South Metropolitan preference 95¼, 95⅜, South Suburban 74⅜, 75½, Southampton 76¼. On Wednesday, Cape Town 60s., Commercial 4 p.ct. 70½, ditto 3½ p.ct. 64½, European 11, Gas Light ordinary 71½, 72, ditto preference 71, ditto debenture 56, 56¼, 56½, 56⅝, 57, Imperial Continental 86½, 86¾, 87, 87½, Primitiva 48s. 9d., ditto preference 62s. 6d., South Metropolitan 73, 73½, Southampton 76¼, Wimbledon 85, 85½. On Thursday, Bombay 5 1/16, British debentures (Hull) 66, 66½, ditto (Norwich) 66, 66½, ditto (Potteries) 66, 66½, Cape Town 60s., 60s. 7½d., ditto preference 6 13/16, 6⅞, Commercial 4 p.ct. 70½, European 11, 11 1/16, Gas Light ordinary 70½, 71, 71¼, 71½, ditto debenture 56, 56 5/16, 56½, 56⅝, Imperial Continental 86¾, 87, 87½, Metropolitan of Melbourne 93, 100, Primitiva 46s. 3d., 46s. 10½d., 47s., 47s. 6d., 48s. 1½d., ditto preference 65s., South Metropolitan 73, 73½, Southampton 76, 76¼. On Friday, European 10⅞, 11⅛, Gas Light ordinary 70½, ditto preference 70⅜, 71, 71¼, 71½, Imperial Continental 86¾, 88, ditto debenture 65½, Primitiva 46s., 46s. 3d., 46s. 10½d., 47s. 3d., 47s. 6d., ditto preference 63s. 9d., South Metropolitan 73½, ditto preference 94¾, 95, 95¼, South Suburban debenture 87½, Southampton 75¾, 76, Wimbledon 89.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When last Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	50—55	..
374,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	5—5⅛	5 1/16
50,000	10	Feb. 26	16	14%	Bourne-mouth Gas and Water — 10 p.c.	29—30	23—25	..
883,110	10	"	7	7%	Bourne-mouth Gas and Water — B 7 p.c.	15—15½	10⅛—11	..
115,000	10	"	6	6/.	Bourne-mouth Gas and Water — Pref. 6 p.c.	13¼—14	9—9⅛	..
159,740	—	—	—	4%	Bourne-mouth Gas and Water — 4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5 1/16%	Brentford A Consolid.	261—266	79—83	..
734,920	"	"	11	4¼%	Do. B New	204—209	76—79	78
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	"	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150*	..
244,200	"	"	8	7%	Do. A Ord. Stk.	154—159	98—103*	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	68
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3—3½	60/—60/7½
100,000	10	—	—	4¼%	Do. 4½ p.c. Pref.	4—6	6½—7⅝	6 1/8—6⅝
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79	..
1,513,280	"	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	..
560,000	"	"	5⅓	40/-	Do. 3½ p.c. do.	103—105	64—66	70½—71
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	64½
800,000	"	"	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	61—63	39½
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	10⅛—11⅛	..
16,313,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke — 4 p.c. Ord.	98—102	70—72	10⅛—11⅛
2,600,000	"	"	3½	3½%	Gas Light and Coke — 3½ p.c. max.	76—79	56—58	70½—72
4,062,235	"	"	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	70—72	57½
4,674,850	"	June 11	3	3%	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	55—57	70½—71½
130,000	"	"	10	10%	Gas Light and Coke — 10 p.c. Bonds	..	..	56—57
258,740	"	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	48—53†	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	7⅛—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125*	..
131,000	Stk.	Mar. 12	7⅞	7%	Ilford A and C.	151—154	92—97*	..
65,780	"	"	6⅜	5½%	Do. B	115—118	72—77*	..
65,500	"	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	85—90	86—88
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	65 7/16—65½
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87*	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. — A	211—213	81—82	..
					Liverpool 5 p.c. Ord. — B	146—148		..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅛—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	93—100
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	7⅜—8¼	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	71—72	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9¼—10¾*	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	"	12	11%	Do. C	118—121	73—78	..
52,000	50	"	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	2¼—2½	42/6—48/9
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	3 1/16—3⅝*	61/3—65/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	7⅜—8½	..
125,000	50	July 1	5	5%	San Paulo — 5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	"	"	10	10%	Do. B	222—224	180—184	..
528,500	"	"	10	10%	Do. C	220—222		..
90,000	10	May 28	9	6/-	South African	10½—11½	8½—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74	72—73⅜
—	—	—	—	—	Do. Pref.	..	—	94⅜—95½
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	..
224,820	"	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
952,795	"	"	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	74⅜—75½
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	87½
647,740	"	May 14	5	5%	Southampton Ord.	99—102	76—78	75⅜—76½
120,000	"	Feb. 12	7½	5½%	Tottenham and District — A 5 p.c.	135—138	92—97	..
782,275	"	"	6	4%	Tottenham and District — B 3½ p.c.	115—117	66—71	..
181,255	"	June 26	4	4%	Tottenham and District — 4 p.c. Deb.	87—89	63—65	..
182,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅜	72/6	Wandsworth A 5 p.c.	151—156	112—117	..
255,636	"	"	6⅜	57/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	"	"	5/17/3	50/9	Do. C 3½ p.c.	110—115	84—89	..
852,000	"	"	6⅜	51/3	Wimbledon 5 p.c.	117—122	85—90	85—89
98,000	"	"	6⅜	57/6	Epsom 5 p.c.	121—126	93—98	..
88,416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXXXIX. No. 2837.] LONDON, SEPTEMBER 25, 1917. [69TH YEAR. PRICE 6d.

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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

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VOL. CXXXIX. No. 2837.] LONDON, SEPTEMBER 25, 1917. [69TH YEAR. PRICE 6d.

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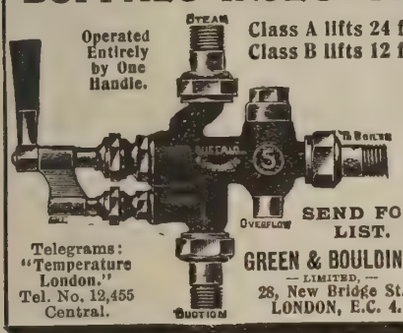

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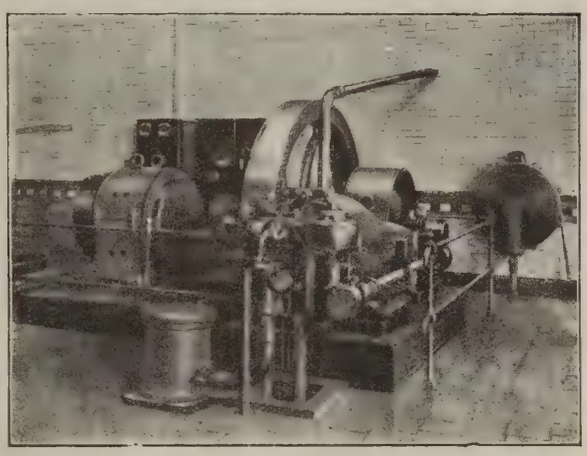

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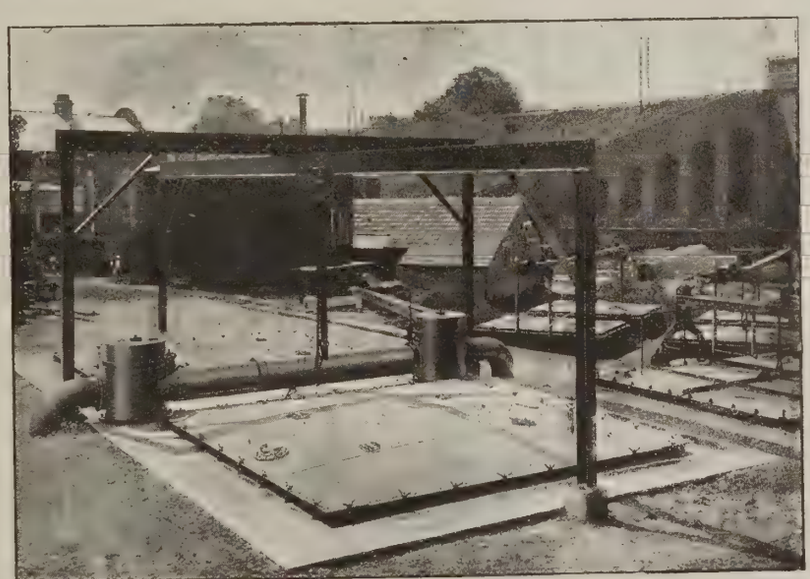

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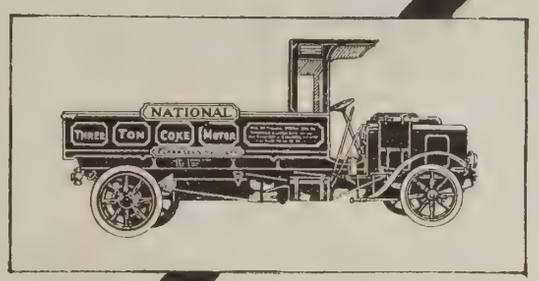

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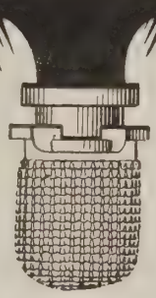

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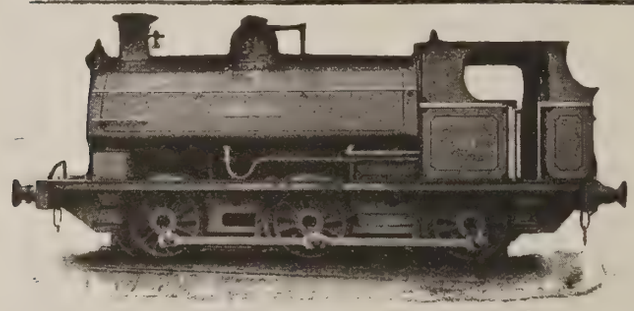

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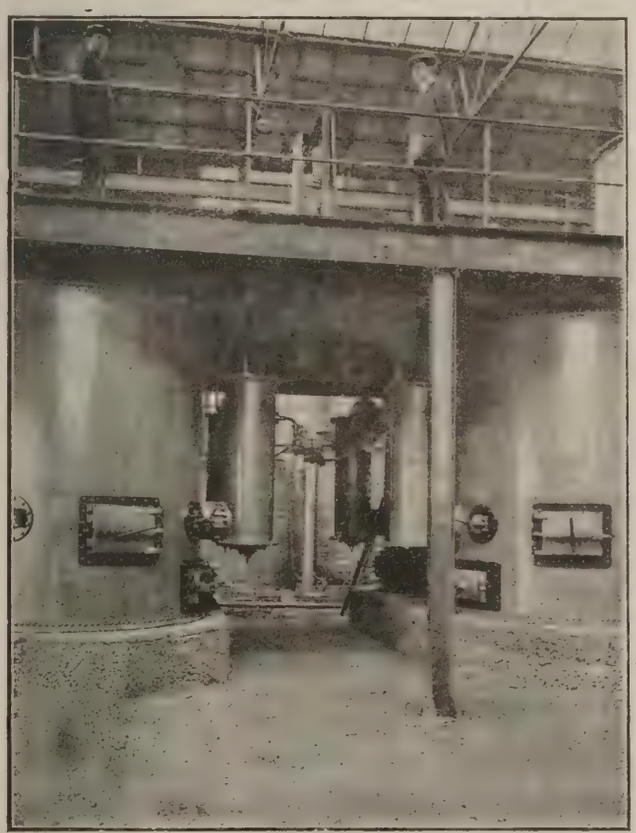

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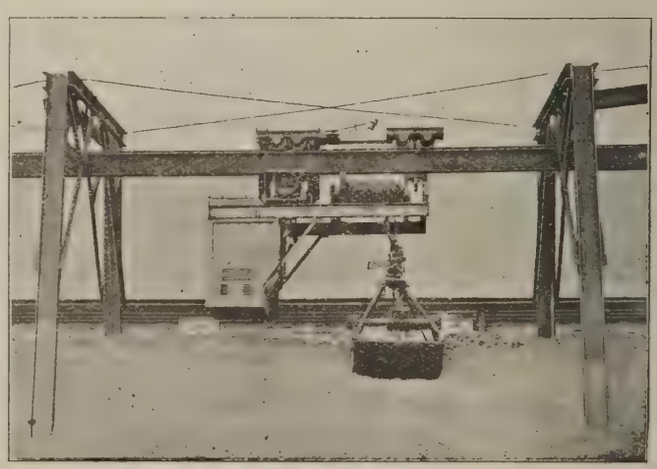

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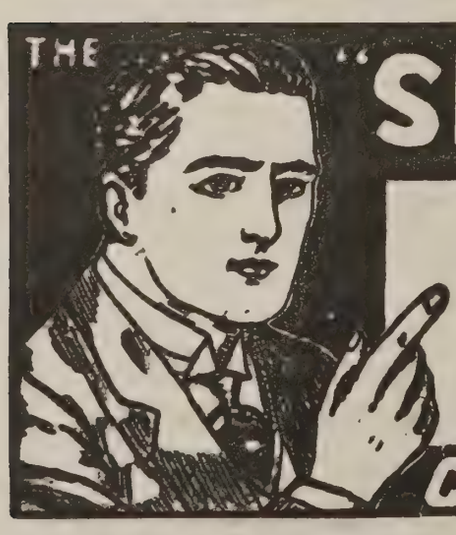

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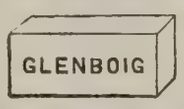
TRADE 

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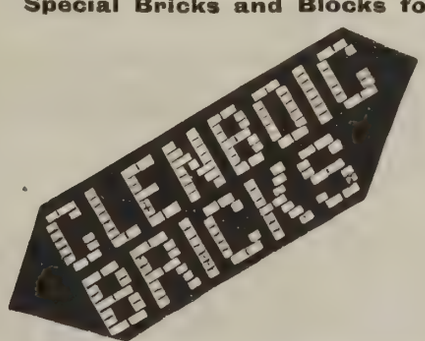

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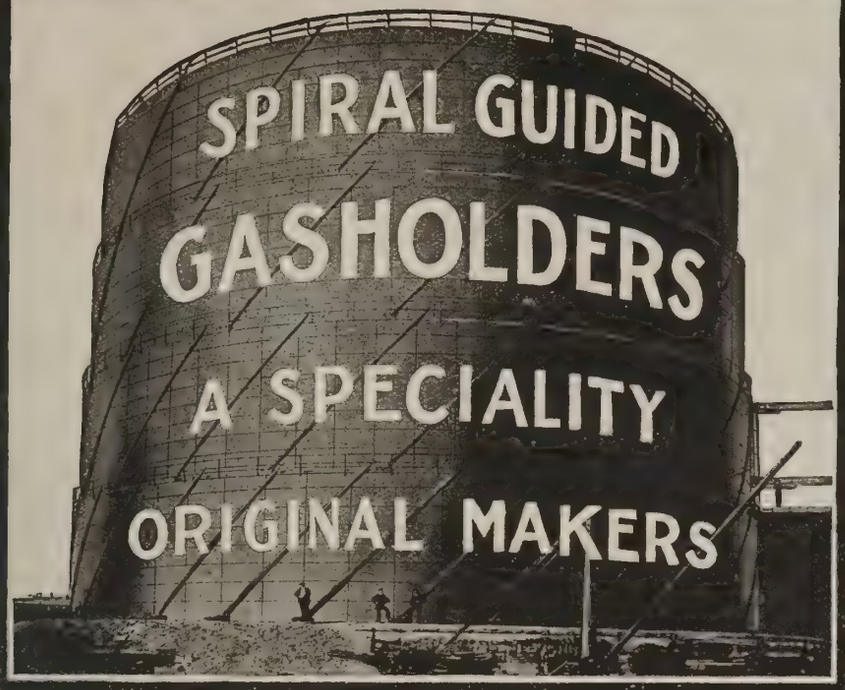

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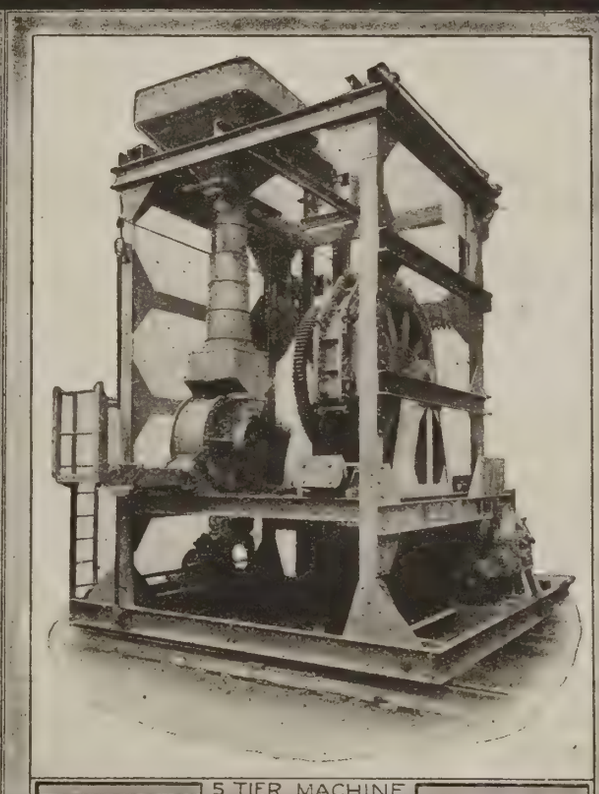

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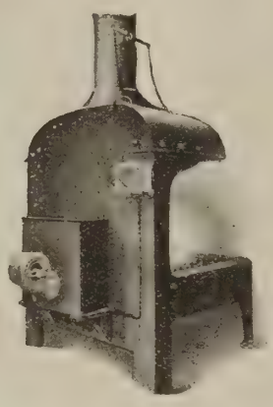

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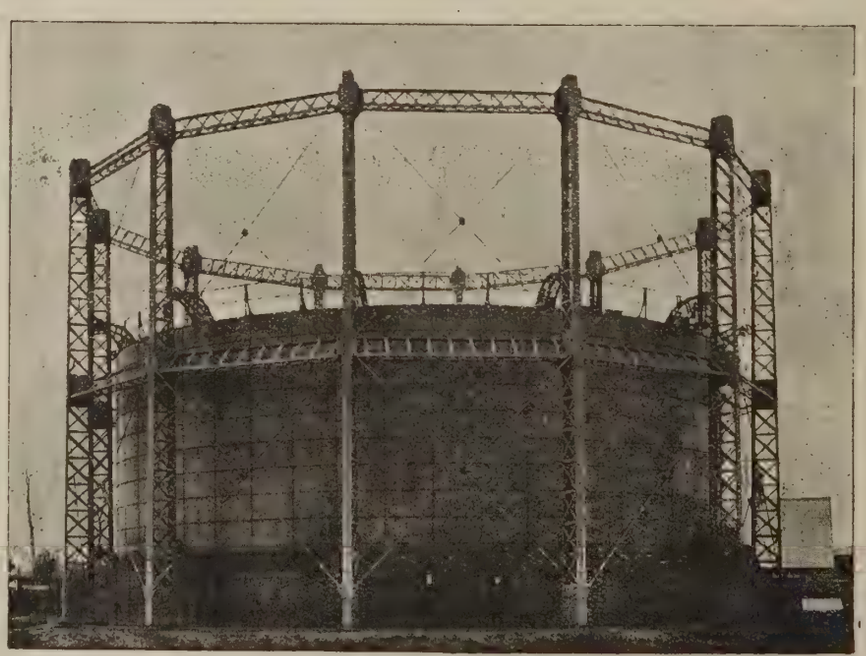

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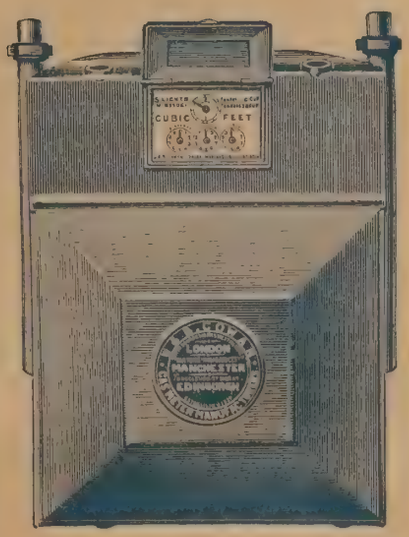

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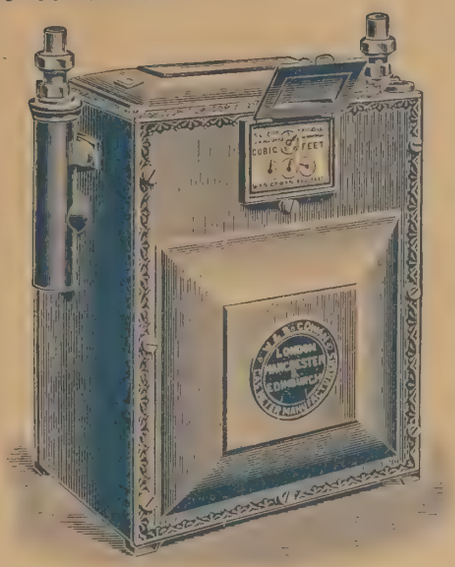

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